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EDITORIAL NOTES.

The Report and Accounts of the Gaslight and Coke Company.

THE report and accounts of the Gaslight and Coke Company for the past half year have been awaited with exceptional interest—not unmixed with anxiety—by reason of the weakness betrayed in the preliminary dividend announcement. So rapid a depletion of the Company's cash resources, notwithstanding the maintenance up to the end of the last quarter of the advanced price of gas in Northern London, seemed to bode no good to this sorely-tried undertaking; and it was felt that the figures published did not promise well for the working under the conditions of the reduction which came into force with the New Year. We wish it could be truly said that these apprehensions are completely removed by the publication of the accounts.

In one respect, at least, these show better than the worst that was feared. There has been at last a nominal increase in the quantity of gas sold—2½ per cent., which is about the best feature of the accounts. True, it is calculated upon a quantity which itself was a falling off of some 6 per cent.; but even so it is better than another decrease, which would have looked very b'ack indeed. The total quantity of gas accounted for in the present statement is 10,511,472,000 cubic feet, which is not very greatly different from the figure of 10,412,938 which is the record for the December half of 1896—five years ago. A year later it was higher; so that we have gone back to the nearest equal record. Unfortunately, matters have not much improved with the Company during this period. The one solitary gain claimed by the report—the reduction of wages—is more apparent than real. There is something in it, doubtless; but having regard to the large growth of the output of carburetted water gas (which is a matter that ought to be more clearly shown in the accounts), the statement in the report cannot be accepted as not being open to question. It should be made known what is the policy of the Board, if they have one, in regard to their so-called "oil-gas" production, which last half year mounted up to 1,935,473,000 cubic feet. Five years ago the corresponding figure was 739,543,000 cubic feet. What is the justification—economical, technical, or administrative—of this enormous increase in the manufacture of this expensive kind of gas? It is obvious that the legitimate needs of "enrichment" are far surpassed by this record.

Apart from this grave question of oil-gas manufacture, which ought to be faced without any more delay, there are three salient features of these accounts to which the attention of the Governor and the proprietors may well be directed. The first is the financial manœuvre by which the *laches* of the Board in the matter of the muddled stock issue were repaired at a cost to the proprietors of £17,610. That is a nice little petty-cash account for one year of a Board of wealthy men, who, though some of them have never known much about the manufacture of cheap gas, have always posed (through the Governor) as financial magnates of the first water. Next, the restriction of the Company's operations, manifested by the remarkable cutting-down of the capital expenditure and the cessation of the automatic meter trade, must, at any rate, be admitted. The third matter for comment is the depressing state of the coke and other residuals markets. Of course, the turn of the market is beyond the control of this or any other gas company; but what the proprietors and the public who suffer for these shrinkages would like to have better assurance of is, that the business of the Company in these branches is efficiently done. It is difficult to indicate what kind of assurance would be regarded as satisfactory in the circumstances. There has been too much jaunty optimism in every official pronouncement of the Board during the whole period in which the affairs of the Company have been drifting into their present state, for anything of the same character, emanating from the same source, to carry weight outside the precincts of the Horseferry Road. Within that charmed region, sheltered by an Act of Parliament against all the winds that blow, nothing appears to matter. The present statement of accounts should be remembered as exhibiting the remarkable picture of a gas company paying interest and dividends on an investment of close upon 26 millions sterling, with not a penny of authorized capital remaining unissued. The columns for this entry in the capital, stock and loan, account are blank.

The South Metropolitan Report and Accounts.

THE report of the Directors of the South Metropolitan Gas Company for the past half year contains several statements of great interest in relation to the development of the Company's business at the present time, which is so peculiarly a period of transition in the history of the undertaking. The previous report announced the intended reduction of the standard illuminating power of the gas supplied by the Company from 16 to 14 candles, and the concurrent alteration of the price from 2s. 8d. to 2s. 3d., from Midsummer. Of this last figure, 2d. was for the two candles of illuminating power taken off; but, as a matter of fact, although the reduction of price has been made in full, the illuminating power has only been lowered by one candle. The Company availed themselves immediately of the relief from the obligation to enrich the make; and the appropriate account of coal carbonized shows that nothing but "Newcastle coal" was consumed as the raw material of gas manufacture. For the first time, the "Statement of Coal" is in a single line of print, without any explanatory note. But Newcastle coal, carbonized in the ordinary way, makes 15-candle gas in the main; and the Engineers have so far not seen their way to work down to the new standard.

It is carefully explained that the contention advanced in support of the Company's Bill of 1900—that the consumers would not experience any appreciable difference in the matter of light from the alteration of the standard illuminating power—has been fully justified. The complaints of bad lights in the half year have been "considerably less than "usual;" and the percentage of increased consumption, instead of the figure 15 or thereabouts which the Company's opponents declared would result from the reduction of the illuminating power, is 6¾ per cent.—a quite normal figure for this Company, and, by a coincidence, almost exactly the same as that of the adjoining Crystal Palace District Company, who have made no change in the character of their output. Consequently, the consumers have really gained the whole of the reduction of 2d. per 1000 cubic feet—representing an economy of about £90,000 a year. The immediate saving to the Company on revenue account is represented by the discontinuance of the useless enrichment, which used to cost about £20,000 a year for materials alone. These returns should be competent to "nail down" for good the "coffin" of 16-candle gas for London, whose death at the hands of Parliament (instigated by the South Metropolitan Company) was so much deplored at the London County Council meeting reported in last week's "JOURNAL." Here it is one of the much-abused Companies that have given the public £90,000 a year, while the County Council did their best to keep it from them.

Unfortunately, although coal has fallen in price, there has been a greater relative fall in the receipts for coke; and other residuals have also diminished in value. The dividend after the rate of 5 per cent. can be paid, by dipping into the surplus standing over from the June half year. It is worthy of remark that the Company are pushing the slot-meter branch of their business as usual, and have not yet experienced any indication of the saturation of the district. It is little less than wonderful to relate that 7130 tenements were fitted on this system during the past half year, or more than 45 per day. The references to the good working of the employees of all ranks are as cordially appreciative as usual; and not the least satisfactory evidence of the fact is the cost of carbonizing wages, which works out at 2s. 3·4d. per ton. The concluding paragraphs of the report explain the main objects of the Company's new Bill, which will be

submitted to the proprietors at the Wharncliffe meeting to follow the ordinary general meeting.

The report explains the state of the Company's affairs so fully that there is nothing much to be learnt from the figures of the accounts. No less than £104,915 of capital expenditure has been necessitated during the half year to keep up with the demands of the growing business, of which £37,431 went for new extensions of works, and the balance for distributing plant and fittings. The outlay on repairs and maintenance is well kept up; £113,436 being charged under this head. The gross profit carried to revenue account was only £156,937. The reserve fund stands at £136,811; and the insurance fund at £70,389. The Company's financial position is, therefore, very strong. The amount borrowed from bankers, £300,000, is exceptionally large for the Company. The state of the residuals market is the dark spot in the accounts; and this is not peculiar to them.

South Wales Miners in Congress.

The proceedings at the annual conference of the South Wales Miners' Federation, held last week, go to show that the resolute attitude of the employers on the subject of the stop-day policy adopted by the men in the early part of this winter, and the quiet, determined way in which the action for damages (estimated at £100,000) against the Federation is being pursued, are having a decidedly sobering effect on the men. The President, Mr. W. Abraham, M.P., better known as "Mabon," who, being absent in America, had no direct share in the policy of stop-days, even went so far as to say, in his address, that, if he had been at home, in all probability his colleagues would not have carried out that policy to the same extent as they did, and that he believed also that the employers would not have carried the prosecution of the matter on their side so far as they had. "His own opinion was that the question that had led to the stop-day legislation should be settled out of Court. Let them put their heads together and see whether an amicable agreement was not possible."

We doubt if the employers will take quite so "innocent" a view of the matter. The readiness of the original aggressor, when he finds that the aggrieved really means to obtain redress if it is to be had, to come to an "amicable agreement," is very touching; but it touches one's sense of humour rather than one's heart, especially when it is considered that the amicable agreement is apparently to consist in the employers granting the men's demand for a minimum wage, and forgiving past events—which the employers say cost them about £100,000! It would, of course, be very awkward, both for the Federation and for Trade Unionism generally, if the former were mulcted in damages to the extent even of half the claim. A settlement out of Court would certainly be more convenient; an amicable agreement much more desirable. So the employers are invited to a friendly discussion.

Now, we have no desire whatever to see a strike or lock-out in South Wales or any other coalfield; but even the loss and suffering thereby entailed would be far better than that the men should get the idea that they are really the masters, and can play fast-and-loose with their employers' interests with impunity. That sort of thing is infectious, and must end in serious trouble sooner or later. This being so, then the sooner the better. While, therefore, hoping that a peaceful settlement of the differences between the coal-owners and their men in South Wales may be found without the sacrifice of the rights of the former—an undertaking upon the part of the Federation that the stop-day policy should not be resumed, accompanied by the deposit of a substantial sum of money as security, forfeitable in the event of a breach of that undertaking, might be held by the owners to be sufficient reparation for the past—we would rather see those differences fought out than settled by a weak surrender to a Union that has shown itself conspicuously arrogant.

Only two other matters discussed at the Federation conference call for notice. One is the definite adoption of the Labour Representation scheme; the Federation agreeing to subscribe 1s. per member per annum to the fund for providing more Labour Members of Parliament. If all the miners in the kingdom adopt the scheme, a sum of about £30,000 a year will be forthcoming; and then it will remain to be seen if the requisite number of constituencies willing to be represented by men who know practically nothing of any but one of the innumerable and important subjects that have to be voted upon by the House of Commons, are to be found. We doubt it.

The other point to notice—and that we do with unqualified approval—is "Mabon's" advice to the miners, and to all other workers in this country, to withdraw their antagonism to the introduction of machinery. This he was constrained to do by what he had seen in America, where "everything" is done by machinery, and yet wages are higher than on this side. The advantages to be gained by the introduction of coal-cutting machinery in our mines—where at present it is practically unknown—are obvious. But we have always been told that the great obstacle in the way of that introduction is the hostility of the miners. With "Mabon" on their side, are there no coalowners in Wales enterprising enough to seize the opportunity and make the experiment?

The Neglect of Opportunity by Directors.

In preparing an article which appears in another part of this issue on high-pressure gas lighting in the City, it occurred to the writer that gas companies are not making sufficient use of the opportunity which the various systems of high-power incandescent gas-lamps offer them in showing and proving, from the illuminating power and costs points of view, what gas can accomplish in comparison with its great electric competitor. Take the high-pressure systems, for example. Nearly all the installations we have noticed in these columns, excepting those at the large Exhibitions of Paris and Glasgow, have been on a very small scale; and, indeed, this method of lighting in our big towns has not by any means been brought to a level to show, from the costs standpoint, its minimum capability. For instance, some of the pressure-raising appliances which are put down for the supply of half-a-dozen lamps or so, are quite equal, without further expense, to serving 60, 70, and even 80 lamps. A ½-horse power gas-engine would afford ample power for the working of a pressure-raiser for the service of quite 120 lamps. Yet gas companies seem content to do as little as they can in proving and forcing upon people the truth that they hold in their hands the best and cheapest means of illumination. Electricity is allowed to step in without any really good demonstration of power on the part of those already in possession. Present expense keeps them back; future profit is lost sight of. A fairly liberal expenditure—unnecessary waste is not what is advocated—in demonstrating capability and power, would be a good investment; so would be the sacrifice of an occasional ¼ or ½ per cent. dividend for the purpose. Push and courage are sadly deficient qualities in some of our directorates. We have heard gas managers say they would do this and that, but they are discouraged by their boards, who look with positive horror on any suggestion which might mean the giving up of a fraction of dividend or the cutting of a slice off the balance carried forward, unless the slice happens to be wanted for the satisfaction of shareholders. But the balance carried forward and reserve funds are not alone the strongest backbone a company can have. A proved impregnable position is something equally valuable; and the proof of impregnability can only be obtained by an outside investment. We know of an important thoroughfare in a not unimportant city in this country now lighted by electricity that would have been given over entirely to high-pressure gas lighting if the gas company had only bestirred themselves, and shown a little spirit. Why, it would pay many a gas company to light up a whole street with high-power burners, at the same price as for ordinary lighting, for a year or two, to keep electricity out of their territory; and even if the demonstration did not entirely prevent the incoming of the competitor, it would do something to retard its progress. Few big businesses have been constructed, and fortunes made, by limited and niggardly expenditure in advertising.

How to Brighten English Streets.

On several occasions it has been our task to try to awaken British architects to a better sense than they have hitherto exhibited of the need of brightening English towns by providing street frontages with light-reflecting surfaces. Little or no notice appears to have been taken of the suggestion; London and the great manufacturing towns continuing to exhibit street fronts carefully designed to neutralize the trying brilliancy of English sunshine and the native extravagance of public lighting. Recently, however, Mr. Halsey Ricardo read a good paper before the Society of

Arts on a cognate subject, "The Architect's Use of Enamelled "Tiles," which deserves to be praised here, as it dealt with another aspect of the same general question. One of the uses of tiles in building is, as Mr. Ricardo said, "for the "purpose of saving or reflecting light;" and it is very remarkable how shy the profession is of making a public display of this feature in building. At the back of town buildings, of course, there is a conspicuous parade of white glazed brickwork; but the architect never thinks that in narrow streets the fronts may be dingier than the backs. The art of building pleasingly with a free use of light-reflecting materials is difficult, and architects are afraid to venture upon it. We are glad to notice that Mr. Ricardo said a good word for the effect of the painting of the Regent Quadrant. When this has been newly done, the frontage leaves very little to be desired on the score of brightness. Unhappily, the effect is only temporary; but it shows what to aim at. Mr. Ricardo distinctly scored by pointing out the admirable way in which external decoration by means of enamelled tiles, glazed faïence, or mosaic goes with the modern method of building in concrete and steel. It is a luminous idea; but where is the artist able and willing to carry it out? The skilful engineer who began to build the South Kensington Museum had ideas that might have led to even better things; but an eminent architect is finishing the building in the "tame respectability of stone." And how dingy and dirty all this stone gets in a few years! Why not try something that is able to wash itself clean in a shower of rain? London would be a very different city to look at if all architects were imbued with a proper sense of the importance of correcting the gloominess of the climate during the long winter months, by building frontages that would help the street lights instead of smothering them.

Damages for the Boston Street Subway Explosion.

One of the things that English people are continually being assured are done very much better in America is the provision of underground tramways for rapid electric transit across congested city centres. There is one of these tramway-subways in Boston, and another is in course of construction in New York. Both have been signalized by something considerable in the way of explosions. The New York performance in this line is attributed to dynamite; but the Boston accident was traced to gas escaped from a street-main that had been carelessly handled. We recorded the proceedings that ensued upon the latter catastrophe, which was unhappily attended with loss of life; but it is necessary to mention it again, because it has just transpired that, after all the time that has elapsed since the occurrence, the Edison Electric Light Company, of Boston, have been joined with the Boston Gas Company as answerable for the injuries caused. The accident happened in March, 1897; so that the legal business in this connection has certainly not been unduly hurried. The proceedings took the form finally of a reference to arbitration; a retired Judge acting as "Auditor," or, as we should say, Sole Arbitrator. What is the exact American translation of the English word "auditor," seeing that this word is now used in the American language in a peculiar significance, is a question which we should be obliged if some Transatlantic reader would kindly answer. This confusion of language is really most perplexing. If the fashion of building "sky-scrapers" has gone as far as erecting a second Tower of Babel on the other side, it will be useful to be warned of the fact. Meanwhile, the Edison Company have to "go halves" with the Gas Company in paying the damages of the explosion of 1897, which is fortunate for the Gas Company, and probably will not hurt the Edison Company. The half-share in question is estimated to amount to $500,000, or £100,000. It is a good tax on harum-scarum work.

The Secret of Good Lighting Divulged.

In a newspaper that came to hand the other day, it was reported that a Mr. P. D. Wagoner has made a comparison, in America, of different street lighting systems. No particulars were given; but, as an illustration of the loose way in which newspapers repeat bits of so-called information, it is interesting to note that this gentleman's experiments "showed that the illuminating power of the electric incan-"descent light is 1·8 times that of incandescent gas, based "on rated candle power." What may be the meaning of this luminous statement it is left to readers to guess. We give it up. Mr. Wagoner's further lucubrations upon the great street lighting question are almost a harder puzzle. He says that "the secret of satisfactory illumination con-"sists in placing lights of any particular intensity sufficiently "close together, so that as uniform illumination as possible "over the lighted area is secured. This secret is one that "is commonly divulged by both gas and electric companies." What is the meaning sought to be conveyed by the use of the word "divulged" here? There was a gentleman in one of Bret Harte's early stories who was fond of using words which struck his fancy, without knowing the meaning. His peculiarity made good fun to read. On one occasion, he is described as refusing coffee made with alkaline water, on the score of its being "too technical" for him. This person has evidently left a family, who occasionally drop into writing to the newspapers. One encounters their productions scattered through the American periodicals; but such writing really demands the use of a glossary by foreigners.

A New Progressive View of Municipal Trading.

Something very serious must have happened to the interior economy of a little journal of Progressive Municipalism established under the name of "London," and now more appropriately styled "The Municipal Journal." Hitherto this publication has consistently magnified everything in the way of municipal enterprise, especially of a trading character; and the motive of lightening the rates by the allocation of the profits on such undertakings as would otherwise be carried on by companies for the sake of dividends has not been disavowed. We have on several occasions taken exception to this headlong advocacy of anything and everything municipal as though the term were a synonym of "the best." We have never descended to the opposite extreme, and denounced Municipalism "on principle," regardless of circumstances and conditions. The only municipal development which has not been countenanced on any terms in these columns is municipal trading for profit. For long, our protest against this error was almost like a voice raised in the wilderness; but now there is a change, and it is to Liverpool, of all places, that the conversion of the "Muni-"cipal Journal" to what we have always held to be the true faith as regards municipal trading is to be attributed. This is the way of it: The Liverpool Corporation find themselves this year in possession of large profits from the tramways and electric lighting undertakings—so the story goes—and are also confronted with the extreme likelihood of a largely increased improvement rate. What more natural in the circumstances than that one consideration should be set off against the other, and the ratepayer spared? But here the newly-found virtue of the "Municipal Journal" takes alarm; and it remarks that, while it is the easiest thing in the world to prevent an increase in the rates by transferring to the general account profits derived from particular undertakings, the process is "not an equitable one." Why? Because "it throws upon the tramways and electric lighting customers "a greater part of the rating burden than is borne by the "people who do not ride in the electric cars, and do not use "the electric light." Well! What else have we been preaching all these years, when the only victims of municipal trading for profit were gas consumers? Lest there should be any misunderstanding of our contemporary's point, it proceeds to state further that the proper way of carrying on "all these municipal enterprises is to first of all ensure their "financial stability by the creation of substantial reserve, "depreciation, and renewal funds, and then to utilize the "surplus balances by the cheapening of the various enter-"prises to the customers. The object of municipalization is "not to make financial profits, but to cheapen and render "efficient the public services." This is quite satisfactory; the only pity being that the lesson has been long in the learning. Most of the practical objections to municipal trading would either disappear or be greatly modified if this rule—which is, as our readers are aware, the Scotch rule—were generally received and acted upon. It supplies the only solid ground upon which Parliament can be asked to allow a statutory undertaking to be municipalized compulsorily. All this, and more, has been duly set forth in these columns for many years past; and now it appears that we have been "Progressive" after all, and did not know it!

Welsbach Prices and Patents.

Some people are expecting too much of the Provisiona Board of the Welsbach Company. The members, we believe, were working just recently every day; and now they

are meeting certainly twice a week. But with all their hard work, miracles are beyond them; and therefore the trade and others must exercise some amount of patience for results from the change in management. Some folks seem to have anticipated that immediately the Provisional Board took upon themselves the control of the business, that prices would drop and patent actions cease. Of course, such expectation is unreasonable. In regard to prices, the Board must be given time to set their house in order before making any radical change; and as to the patents, the Advisory Committee—now the Provisional Board—made it quite clear that the question of the validity of the 1893 patent would have to be tested, and as early as possible. Beyond this, the Provisional Board are busy considering the constitution of the new permanent Board; and it is hardly likely that they will make any important move until those who will have the task of directing the management in the future are brought into collaboration. On these points numerous inquiries have reached the Company; and it has been necessary to issue a circular informing the trade "that no immediate "alteration in the prices of mantles and burners is in con- "templation, and that, if any alteration should subsequently "be decided upon, ample notice will be given before it is "carried into effect. As there appears to be a misunder- "standing in some quarters as to the policy of the Board "with regard to the patents of the Company, advantage is "taken of this opportunity to intimate that it is their inten- "tion to vigorously uphold the Company's patents."

"Inadvertence" at Gravesend.

When referring a fortnight ago to the tampering by Corporation officials with the governors of the public lamps at Gravesend, we remarked that, as the Town Council had referred the subject back to the Works Committee for further consideration, it would be unfair in the meantime to pass judgment upon it. The question has since then again occupied the attention of the Committee; and, as the result of their deliberations, they have recommended the Town Council to write to the Gas Company expressing their regret that, through inadvertence of the Gas Inspector, an error had been committed, and promising not to repeat it. We are sorry to see that the Council almost unanimously agreed to adopt this course—only one member dissenting. Now that the Council have apparently uttered their last word on the subject, we are free to say that it would have been simply impossible for them to have taken up a more indefensible position than they have done. Had they searched through a complete dictionary of the English language, they could not have found a word less applicable to the circumstances of the case than the one they have decided to use. The action that was complained of may have been the result of ignorance or of a mistaken desire to serve the interests of the Corporation; but it could not have been performed by inadvertence. It was—and must, in the very nature of things, have been—a deliberate action. A sportsman when shooting at a pheasant may by inadvertence hit a gamekeeper in the leg; but he cannot by inadvertence carry a gun and take aim with it. Neither can a man by inadvertence provide himself with a supply of **S** hooks and use them for the purpose of weighting the governors of the public lamps. That a body of (presumably) business men could ever have been found who would agree to the putting forward of such a ridiculous excuse, we should not have believed. The Gas Inspector pleaded that he acted quite innocently in what he did; but with his motives we have now nothing to do. The Council have made his cause their own; and any blame there may be in the matter will henceforth attach to them. We shall be curious to see if, under these circumstances, the Gas Company consent to withdraw their assertion that they have been the victims of a "gross fraud."

Oil for Carburetting Water Gas.

Drawing attention in last week's issue to the question of oil for carburetting water gas, we showed that there had been a considerable drop per gallon in the contract price during the past twelve months; and on the authority of two important oil-supplying companies, we gave the current price as 2½d. per gallon. As supplementing what was then stated, it will be of interest to makers of carburetted water gas to learn that the first cargo of Texas gas oil is due to arrive this week, and that, from the information we have, it is pretty clear the importers are going to make a strong bid for business. This competition with the established oil companies doing business with gas undertakings will no doubt have the effect of steadying the price of the oil, and keeping it at a low level—at a figure at all events which will make a sensible difference, in comparison with a year and more ago, in the cost, per 1000 cubic feet, of producing carburetted water gas, and at the same time maintain a better complexion on the manufacture from the economical point of view. This first cargo, we understand, has all been bespoken by some of the principal gas companies; but the importers, we are told, are prepared to guarantee a continuous supply. A fraction under 2½d. is the price spoken of at which they are open to enter into contracts; and these may be arranged to run for a number of years. We are told that the oil has a specific gravity of about ·885, and a flash point of 170° Fahr. It will be interesting to see what effect this new competitor will have upon a market which has not always been kind to gas undertakings manufacturing water gas.

Coal Teamsters Boycott Fuel-Gas Users.

For their enjoyment of one of Nature's acts of munificence to them, the people of Chicago are to temporarily suffer—that is, if an American correspondent of "The Times" has not been made the subject of a practical or ludicrous joke. He tells his little story with all seriousness; and therefore we take it he himself believes it to be true. It appears that the city of Chicago, among its many other institutions, has a Coal Teamsters' Union. There is nothing laughable about this when we remember that in this country we have, or had, a Union which watches over the interests of our domestics. But the coal teamsters of Chicago must be an influential integrant part of the community, and their occupation an attractive and paying one; for our contemporary's correspondent informs his readers that the Union numbers 4000 members. To keep them all in occupation, too, the coal business of Chicago must be a thriving one. But the teamsters are dissatisfied, and in their dissatisfaction they have arrayed themselves against one of Nature's kindly provisions for the comfort and benefit of the people of the city. In their wisdom, or their crass ignorance, they have decided not to deliver coal to any building in which fuel gas is used in summer and coal only in winter! Other Unions, the story runs, have now joined hands with the teamsters; and unless an agreement is soon effected, many great office buildings in Chicago will be without heat and elevator service. Did anyone ever hear of such senseless action as this? The fuel-gas consumption of Chicago is much larger than that of the ordinary manufactured gas; and the users must therefore form an important body, and a body not altogether destitute of resource. They will, if the tale be true, no doubt soon find means to tide them over the difficulty, until they can make provision for bringing their cheap gas supply into use for winter heating and elevator working. The teamsters' action will simply drive the fuel-gas consumers further along the road out of which the discontented haulers of coal wish to turn them. Verily this is cutting off one's nose to spite one's face with a vengeance. The coal carmen of this country might take a hint from their fellow-workers in Chicago. The gas companies would be greatly obliged to them.

The Steam-Roller Again.

The adoption of electric lighting, and the construction in the public thoroughfares of the manholes which are a necessary part of the service, have exposed pedestrians to another danger of the streets, in the shape of the explosions which occasionally take place in these boxes. That coal gas is not always the cause of these disasters, was shown a few weeks since in connection with the explosions in the City. At the same time, it must be acknowledged that it is sometimes to blame. This was the case at Swansea, where, on the night of the 25th ult., the residents who were in the neighbourhood of the High Street, engaged in spending the "market penny," had a narrow escape from serious injury from a sudden flash of fire accompanied by the blowing off of some of the electric light manhole covers. The immediate cause of the trouble appears to have been the ignition of escaped gas at a lamp used by the Assistant Electrical Engineer in searching for a leakage of water which was running from the electric lighting mains into the trenches, and causing trouble at the works. The remote cause, however, was, in all probability, the recent working of a 15 to

20 ton steam-roller over the trenches of the gas and water mains and electric cables, as they were all found to be broken. The pressure must have been very considerable, for the gas-mains were laid at a depth of 2 ft. 6 in., compared with 2 feet in the other cases. The principal sufferer from the accident was the Assistant-Engineer; but fortunately the personal injuries were slight, considering the crowded state of the neighbourhood at the time. The Company are doing well to seek compensation.

An Early Testimonial to Gas.

Our contemporary the "Globe" has been publishing some extracts from its issues in past Coronation years; and, among others, we were interested to read the following item, which appeared on Feb. 13, 1838—the year of our late Queen's Coronation: "A false impression, it seems, has got abroad that the lighting of the House of Commons by gas would cost after the rate of £3 per hour; whereas the result of last night's experiment, we understand from good authority, will not exceed one-third of this sum. As to the general effect produced, there cannot be two opinions of its great superiority to any former mode of lighting. All the heat, as well as the products of combustion arising from the burning of so much inflammable matter as is requisite efficiently to light so large an area, is perfectly insulated by the ground-glass screen which forms the ceiling of the building." On the whole, gas does not appear to have much to be ashamed of when its past is looked into; and we welcome these little peeps into its early history.

An Acetylene Association.

Since the delivery by Professor Vivian B. Lewes, a few years ago, of the memorable lecture at the Society of Arts in which he demonstrated the practicability of producing a brilliant light from carbide of calcium, interest in the subject in this country has increased with time. Trials of the new system were carried out; and although it was regarded as a possible competitor with the ordinary methods of lighting, it was thought by some that it would not be a very formidable one. The exhibition of acetylene generators held, under the auspices of the Society of Arts, at the Imperial Institute in 1898, however, showed very clearly the capabilities of the new illuminant; and the series of Cantor Lectures delivered by Professor Lewes before the Society fully described the methods of its production and application. Acetylene lighting became of sufficient importance in the commercial world to have a publication devoted to it; and the latest step in the direction of placing it upon a substantial basis has been the formation of an Association "for the advancement of acetylene gas engineering and "manufacture in the interests of the public and of the indus-"try." It is proposed to do this by inviting from members and others communications on the above subjects and discussing them, holding exhibitions, having conferences with municipal and other authorities and bodies, and acquiring and publishing information likely to be of service. The Association has been licensed by the Board of Trade to be registered with limited liability without the addition of the word "Limited" to the title. Among the honorary members are Mr. C. Vernon Boys, F.R.S., one of the Metropolitan Gas Referees; Mr. H. E. Jones, Engineer and Manager of the Commercial Gas Company; Professor Lewes, F.I.C., F.C.S.; Dr. Boverton Redwood, F.R.S.E.; Mr. J. Swinburne, M.Inst.C.E.; and Sir Henry Trueman Wood, Secretary of the Society of Arts. The Chairman of the Council, which is a representative one, is Mr. F. G. Worth; the Secretary (*pro tem.*) is Mr. Lacey Downes; and the offices are at No. 11, Ironmonger Lane, E.C. The Association starts under good auspices; and we wish it a useful and successful career.

Mond Prospects.

We must confess to having experienced a slight feeling of depression while listening to the speech of the Chairman at the first ordinary meeting of the South Staffordshire Mond Gas Company; and it afterwards proved that we were not alone in this. Sir Benjamin Hingley seemed (in view of all that has been said by its supporters in favour of the scheme) to adopt an almost over-cautious tone; and at the conclusion of his remarks, one of the shareholders asked Dr. Mond if he could not speak with more confidence of the Company's prospects than the Chairman had done. Dr. Mond very rightly refused to recognize any necessity for him to confirm the statements which had appeared in the prospectus under his and the other Directors' names; but still, seeing the long time that must elapse before the shareholders can hope to get any return on their money, there does appear to be some justification for their expecting something more than the several times repeated statement that they must exercise "faith and patience." This is so obvious that there hardly seemed any necessity to say it even once. That the proprietors do not all recognize the heavy task the Board have before them, was proved by one of them asking if any Directors' fees would be payable before the Company started making gas. This query, however, was received with the loud laughter it deserved.

Sunday Labour in Gas-Works.

During the last few years, Mr. R. G. Shadbolt, of Grantham, has been the chief among the public advocates of the reduction of Sunday labour in gas-works; and in his work in this regard he should, by the hearty co-operation and sympathy of his professional brethren, be encouraged to persevere. Some three or four months since, he, at the request of several gentlemen who have interested themselves in the movement, sent out no less than 1600 circulars, in which five simple questions were put, the replies to which would have enabled Mr. Shadbolt to gauge the progress made in the direction of securing a suspension of labour on the first day of the week, and to bring his statistics up to date. It is rather surprising and disappointing to learn that so far only 440 replies have been received, which is a poor reward for a praiseworthy effort, voluntarily taken in hand, and involving considerable work. This is not, be it remembered, an instance of the abuse of inquiries by circular. There is nothing offensive or intermeddling about it; but it is a legitimate, and in fact kindly, effort to help forward a good cause by letting the industry know what is being done in connection with this question of Sunday rest. This is a case in which published information as to progress is almost certain to produce further progress by reminding Directors and Committeemen of their responsibility in the matter, and by indirectly suggesting to them that, as opportunity permits, they should make provision for enabling a partial, if not an entire, cessation of work during Sunday. Therefore, now that the winter pressure has almost passed, and the balancing of accounts is about completed, we make a sincere appeal to the 1160 recipients of Mr. Shadbolt's circular who have not responded to encourage him by doing so as early as possible. No harm can result; but good may follow. If it is desired that the name of any undertakings should be kept private, Mr. Shadbolt will respect the wishes of his correspondents. In order that the misplacing of copies of the circular may not prevent a return being made, we will reproduce the five questions. They are: "(1) Have you effected any diminution in Sunday labour at your gas-works, particularly in the carbonizing department? (2) If so, to what extent? (3) Assuming the character of your plant, or local conditions, to be such as to prohibit Sunday stops, are you in favour of the movement? (4) If not, why? (5) Any remarks."

WATER AFFAIRS.

The Government Water Bill.

THE notification made to the House of Commons by the President of the Local Government Board, a few hours after the opening of the session on the 16th ult., that on an early day he would ask leave to bring in a Bill for the establishment of a Board to "manage the supply of water within "London and certain adjoining districts," in accordance with the intimation to this effect in the Speech from the Throne, was followed last Thursday—exactly a fortnight after the notice—by the introduction of the measure. The sceptics who refused to believe in the sincerity of Mr. Long's promises last year, and whose doubts were not entirely removed by the inclusion of the London Water Question among the subjects on which the Government intended to initiate legislation, must now acknowledge that their mistrust was unjustified. In addressing the House in support of the request he was going to make, he laid the whole subject before the members in the thoroughly statesmanlike speech which will be found in another column. He was followed by Sir Henry Campbell-Bannerman, as Leader of

the Opposition; and then came a debate in which the Metropolitan members were naturally the chief speakers. Their remarks, on the whole, were not unfavourable to the Government scheme for solving the difficult problem they have taken in hand. Naturally, the claims of the County Council to be the Water Authority for London were put forward by those in whose eyes that body is "sacrosanct," as "The Times" put it. But Mr. Long pointed out, in the excellent historical retrospect with which he prefaced his explanation of the details of his scheme, that the Council had had the opportunity of occupying the coveted position, and had failed to use it properly. He told them plainly that their action in regard to the London Water Question was not such as to "secure "the confidence of the community or of the House;" and consequently, if they felt aggrieved that they were not to be entrusted with the sole control of an important public service such as the supply of water in the Metropolis, they must "blame themselves rather than the Government or "Parliament." Mr. Long closed his address by emphasizing the fact that the Government, in taking up this difficult question, had not been animated by any feeling of hostility to the Council or to any other local body, but had striven honestly to find a practical solution of it. Accepting this assurance on the point, let us see what the Government propose as that solution.

At the outset, Mr. Long reminded the House that an attendant result of the increase in the population of London was the growth of the outer areas, which are mainly served by the Water Companies; and that therefore, if what is called Water London is to be placed under the control of an administrative body, it must be representative of the entire area interested. The London County Council do not fulfil the primary condition. Mr. Long proposes to take all the Sanitary Authorities in the area supplied by the Companies, and charge them with the duty of selecting representatives to serve upon a Water Board, to be composed of 67 members, made up as follows: Of the 28 Metropolitan Boroughs, six of them (Islington, Kensington, Lambeth, St. Pancras, Stepney, and Westminster) will have two, and the rest one each; the Common Council of the City of London and the West Ham Borough Council, two each; East Ham, Leyton, Walthamstow, and Essex, one each; the County Councils of Hertfordshire, Kent, Middlesex, and Surrey, one each; the Thames and Lea Conservancies, one each; and the London County Council, ten. The urban districts in the outer areas are to be grouped together, and each group represented by one member. There is, of course, to be a Chairman and also a Deputy-Chairman, who may be elected from outside the body, and will be paid. The foregoing arrangement gives to London, as represented by the Metropolitan Boroughs, the City, and the County Council, a majority of two-thirds of the representation. The first Board is to be elected for four years, to allow time for getting into working order; but subsequently the members will retire at the end of three years, as in the case of the London County Council. There will be no election to the Board in the ordinary sense. The Local Government Board are to have the power of varying the constitution of the Board if circumstances call for it; but sanction to the change has to be obtained by means of a Provisional Order.

The Board having been constituted, what is to be its duty? To purchase the undertakings of the London Water Companies, before an "appointed day," by agreement if it is practicable, or, failing this, by arbitration. The "appointed "day" fixed in the Bill is Jan. 1, 1903; but it may be deferred for any period not exceeding a year at the discretion of the Local Government Board. If the Water Board and the Companies do not come to an agreement, the price to be paid to them will, as already stated, have to be settled by arbitration. This important duty will be entrusted to Sir Edward Fry, Sir Hugh Owen, and Sir John Wolfe Barry. The announcement of the names of the Arbitrators was received with cheers, which were repeated when Mr. Long said he thought that the House would agree that the Government had been extremely fortunate in securing the services of these gentlemen. We do not consider their ability to deal with this question will be doubted for a single moment. They will go to its consideration, if called upon, with two clear instructions: The Companies are not to be allowed the usual 10 per cent. for compulsory purchase; and the price to be paid to them for their undertakings is not to be enhanced or diminished on account of the Bill having been introduced. The decision of the Court of Arbitration is to be final in regard to all matters of fact; but the Court of Appeal may be applied to, if needful, upon questions of law.

The price having been settled, how are the undertakings to be paid for? The Board are to have authority to issue water stock at 3 per cent., and to pay the Companies therein. They will control and administer the whole area now governed by the Companies, and have powers of rating which they will be able to put in force in the event of the income for any year being insufficient to meet the expenditure. With regard to the sinking fund, the Government have adopted the suggestion of the last Royal Commission that the Board should be granted a longer period than usual before beginning to create it. Accordingly, for money borrowed for either the purchase or the redemption of stock, they allow the ordinary term of sixty years, but postpone the commencement of the fund for twenty years; thus giving a period of eighty years. Where money is required for any other purpose, it will have to be redeemed in the customary time—viz., sixty years. With regard to the portion of London which is purely rural, the Government scheme leaves it very much as it is. Special arrangements are, however, made to meet the cases of such places as Finchley and Croydon. Provisions are also made with regard to the servants of the Companies, and the dissolution of the Companies after the completion of the purchase.

The foregoing is an outline of the Government scheme, as expounded to the House of Commons by Mr. Long. That it will have the serious attention of the directorates of all the Companies was promised by Mr. Boulnois, the Chairman of the West Middlesex Water Company and of the Staines Reservoirs Joint Committee, in the few remarks he made in the course of the debate. It departs in several respects from the recommendations of Lord Llandaff's Commission; but until time has been afforded for a study of the Bill, detailed criticism of its various provisions must be deferred. Meanwhile, we may frankly acknowledge that we accept Mr. Long's measure as "an honest attempt to deal with a very "difficult question;" and our contemporaries seem mostly in accord with us. The "Daily Chronicle" considers that, in many ways, the scheme is better than it had looked for, though it "falls far short of what London had a right to "expect." The "Standard" regards it as workmanlike and satisfactory; but "The Times" suggests that it would be well for Londoners "not to expect too much from this or "any other scheme of purchase." With this word of caution we will take leave of the subject for the present week.

Company or Local Authority.

A Local Government Board inquiry of considerable importance to water companies contemplating the extension of their areas of supply, will be found reported in another part of to-day's issue. The Mid-Kent Water Company, being desirous of furnishing water to several villages at present without a supply, are applying to the Board of Trade for a Provisional Order to allow them to include the district in their area; and the Hollingbourne Rural District Council (who on two previous occasions threatened to oppose the Company if they asked for the powers they are now seeking) have meanwhile come forward with a rival scheme. It was in connection with their application for authority to raise a loan of £10,000 for the purpose of carrying this into effect that Colonel W. R. Slacke was sent down to hold the inquiry. The contentions of the Company are that they have had experience in the matter of water supply; that they are financially able to carry out the scheme; that they have an ample supply of tested water; and that if the district is given to them, there will be no liability on the ratepayers generally. The Council, on the other hand, say that Parliament has specially pointed out District Councils as the authorities to look after the water supplies; their Counsel stating that he did not, in his experience, know of a case where a body of promoters had been permitted to come in and contest the right of the District Council to carry out their duty. The matter which the Local Government Board have to decide is therefore, to a large extent, one of principle.

Portable Incandescent Gas-Lamp.—A lamp has been invented by Herr M. Mannesmann, of Remscheid, which embodies a gas-holder or reservoir, capable of withstanding a pressure of 75 atmospheres, and a pressure-reducing valve on the connection to the incandescent gas-burner placed above the holder.

ESSAYS AND REVIEWS.

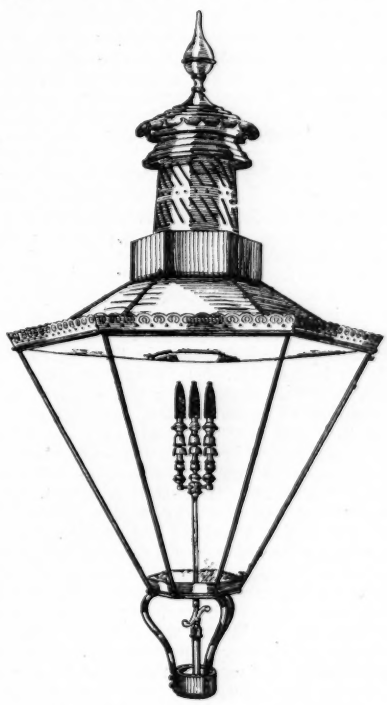
HIGH-PRESSURE GAS LIGHTING IN THE CITY.

THE civic authorities of the greatest commercial centre of the world are to-day looking with a much more kindly eye on gas lighting than was their wont but a few years ago. The flat-flame burner of the old days did not come up to their fancy; incandescent gas lighting in its early years was passed by in favour of the then fashionable favourite—electric light; and it was not until high-pressure gas lighting had proved its efficiency and superiority in other places that our City Fathers turned upon it a benevolent gaze, and then pronounced it good. They have since given it encouragement; and we are not complaining when we say that they commenced doing so by allotting to it positions for trial in situations the most perilous and difficult for any new lighting system. We do not complain because it was evident that, if the system could be made a success on the bridges connecting the City and the southern side of the river—and who better than that old master in the art of lighting, William Sugg, could have had the care of such a critical trial?—then, from that success, would spring opportunities for still greater victories for incandescent gas lighting. Exposed in the fullest severity to all the atmospherical disturbances—for nowhere in the whole City could a worse place have been found for submitting the lights to the full rigour of the winds than the upper and lower heights of the Tower Bridge and in a less degree on the Southwark and Blackfriars Bridges—the Sugg high-pressure gas-lamps soon proved their capabilities in fair weather and foul. They won their way by their splendid performance into the esteem of the members of the City Street Lighting and Bridge House Estates Committees, with the result that further examples have been introduced into other prominent and busy parts. And who can say, if all concerned—the Gas Companies particularly—will only keep a watchful eye on them, and offer a helping hand if needed, what will be the beneficial effect in spreading the high-pressure gas system not only in our great Metropolis, but in other parts of the country. It has been said that in some directions, the Metropolis has to go to the Provinces to learn; and it is true, in a measure, that the Provinces have led the way in the matter of public lighting. That this should have been so, shows a neglect somewhere in high places. But let the reproach be shaken off by the making of a vigorous effort. From Blackfriars to the Tower, the bridges across the river are now all brilliantly illuminated by incandescent gas-lights—three by Sugg's high-pressure lamps, and London Bridge (perhaps only temporarily during the widening) by Sugg's low-pressure incandescent burners—and the approach to Blackfriars Bridge and Ludgate Circus are also illuminated by the higher form of incandescents. This proves success, and a recognition by the authorities of the value and usefulness of the high-pressure gas system. An opening has been made in the electrical fascination of the City; and that opening must be held and expanded as time goes on. It can be done by perseverance. If, by a little aid, the new system can ingratiate itself further into the grace of the City magnates, we have every confidence as to what will be the effect on other Metropolitan and Provincial authorities. We ask for no indulgence for high-power incandescent gas-lighting; its merits, fairly tended, will keep for it a place. But its cause must be properly championed in face of the prepossession of public lighting authorities for electricity.

It is some time since that we described the lighting by Sugg's high-pressure burners on Southwark Bridge; and there followed eleven months afterwards an account of the lighting of the Blackfriars and Tower Bridges. Excepting the cluster lights on the bascules of the Tower Bridge, each lamp on the bridges contains one burner consuming 10 cubic feet of gas (delivered at the foot of the burner at a pressure of 10 inches); and each gives a light of 300 candles nominal. Mr. Sugg does not put any fanciful estimate upon what a burner will do. He has at his back a long experience in all forms of gas lighting; and that experience is based on a scientific foundation, solidified by constant personal research. He has photometrically tested high-pressure burners of many kinds, and at all pressures from normal up to 10 inches and above. Upon these tests, he is satisfied that, when consuming 10 cubic feet of gas at the 10-inch pressure, the highest results are obtained; and at that pressure and at that consumption, the result that can be *depended upon*, in a lamp without a reflector, is 300 candles. But higher results—quite 320 candles per burner—are and can be realized when the mantles are new, and will be continued for some time if the mantles happen to be of good quality; and with a suitable reflector the light emitted can be enhanced quite 25 per cent. But more on this latter point presently.

Now the City authorities after inspections of the new lighting on the bridges, ordered first of all an extension of the system to the approach to Blackfriars Bridge on the City side, by the conversion of two refuge-lamps, which were supplied with gas by the Gaslight and Coke Company. One of these lamps was formerly furnished with a 5-feet flat-flame burner, and the other with a cluster of three ordinary incandescents. Among the electric arcs in the neighbourhood, these two gas-lamps under the old order of things presented an almost pitiful appearance. But to-day their condition is changed; and they have been raised to a dignified superiority among their old exalted competitors. Although the lamps were supplied with gas by the Gaslight and Coke Company, it was arranged that the South Metropolitan Company should undertake the work of conversion, as they had carried out the lighting of the bridge, and so had the high-pressure gas supply at hand. The instruction was that the columns should be fitted with Sugg's newest type of lanterns, with a cluster in each of four of Sugg's patent high-pressure burners, which burners, by the way, were described in our "Register of Patents" on Sept. 24 last, p. 791. The new lanterns (which will be known as the "Blackfriars") are a modification of the "Lambeth" type, which is hexagonal in shape, with a broad hood and the frame gently sloping down to comparative narrowness at the base. The differences consist in the alteration of the ventilating arrangements, and the provision of a large white enamelled reflector the full dimensions of the hood. The "Lambeth" lantern had a conical porcelain reflector; and this has, with great advantage, given place to the one referred to. The latter curves slightly downwards, and has in the centre, for ventilation, a circular aperture slightly larger in diameter than the space occupied by the burners.

Speaking of the ventilation reminds us that it is not an uncommon thing to hear high-pressure lamps emitting a whistling noise in a strong wind; and in a group of lamps this is not found to be common to any particular one or more of the lamps. Its occurrence is as shifting as that of the phenomenal will-o'-the-wisp, and its cause has been the subject of much speculation. Mr. Sugg's investigations has led him to the conclusion that it is due to unregulated ventilation. When the wind blows through the upper part of the lantern, it draws sharply on to the burners, and produces a series of little explosions, which cause the whistling sound. In the new lantern, Mr. Sugg has regulated



THE "BLACKFRIARS" LANTERN.

the ventilation down to actual requirements, in order to obviate the whistling; and he finds the arrangement successful. Well, now, as we have said, there are four burners in each of these new lanterns, and each burner has a nominal illuminating power of 300 candles. But the reflector is credited with augmenting the lighting value by 25 per cent.; so that it may be said that each of the lamps gives an illuminating power of close upon 1500 candles. Their superiority to the so-called 2000-candle power electric arcs hard by is perfectly obvious to all passers. The value of the reflectors is also seen by the splendid illumination thrown downwards all over the refuges; and it is interesting to compare these refuges with others illuminated by electric arcs.

Following on this installation in the approach to Blackfriars Bridge, the Corporation Lighting Committee ordered the erection of five of the new Sugg lamps at Ludgate Circus, but with three burners in each. The circus had been previously lighted by ordinary gas-lamps and electric arcs. The high-pressure gas-lamps have been disposed—one on the central refuge at the commencement of Fleet Street (showing a good-natured face to the electric arc in a corresponding position at the foot of Ludgate Hill), and the other four at opposite points on the east and west sides of the circus. The lanterns—all "Blackfriars"—are fitted with clusters of three burners; affording a light of 1000-candle power. The order to carry out the work was given direct to Messrs. Sugg and Co.; and the Gaslight and Coke Company laid

the mains. To the credit of all concerned, it may be recorded that this installation was made between one Saturday night and church time on Sunday—the rapidity of execution being necessary on account of the heavy night traffic in the locality occasioned by the proximity of the great daily newspaper offices. The gas is supplied by one of Sugg's small pressure-raisers, fixed under the steps leading down to the urinal in the circus, and driven by water supplied from the New River Company's mains. It is worked at a regulated water pressure of 30 lbs. to the inch—the regulation being effected by the pressure-raiser's own self-acting governor. However variable the pressure in the water-mains may be, the governor maintains a constant pressure of 30 lbs on the increaser. The water used for working the ram and raising the gas pressure, is passed forward to the flushing-tanks in the urinal, so that the water used for working the apparatus costs nothing—the expense of the high-power lamps being consequently limited simply to the gas and the maintenance. A slightly larger pressure-increaser could easily supply 70 to 80 lamps; and, as in this case, so in most others, the water could be used for flushing purposes.

With this system of high-pressure lighting, a gasholder is not used, because, as Mr. Sugg puts it, there is always the danger of the holder breaking at the seal. As a rule, it is pointed out, where gasholders are used in similar systems, the rise and fall of the holder is not more than ½ inch; so that a small galvanized iron reservoir will answer all the purpose of the more expensive holder. The compression of gas up to 10 inches in this reservoir (if large enough) gives a sufficient amount of elasticity to keep the lights always steady; and, in conjunction with the reservoir, a governor is used so as to ensure the delivery of a uniform pressure to each of the lights.

To sum up the high-pressure lighting in the City on the Sugg system, we have on and about the Tower Bridge 78 lamps; on Blackfriars Bridge, 39 lamps; on Southwark Bridge, 22 lamps; at Ludgate Circus, 5 of 1000-candle power; and at Blackfriars approach 2 of about 1500-candle, and 2 of 330-candle power.

The improvement in the lighting of London Bridge is also now being carried out by Messrs. Sugg and Co. As already mentioned, their patent low-pressure incandescent burners are being used here, on account of the structural alterations being made on the bridge itself. For these burners, Sugg's patent "Windsor" lanterns, with flat reflectors, have been adopted; and, when a change is effected to the more brilliant form of lighting, these lanterns will find new situations for service in some of the by-streets of the City, in which incandescent gas lighting is going to be extensively adopted.

There is one other feature about high-pressure lighting which may be remarked upon here. Generally speaking, the number of lights in an installation has been small; but, in a conversation with Mr. Sugg, he mentioned the question of larger installations, and pointed out that in the big railway stations or in a mile or two of street lighting, the pressure-increaser could be driven by a steam or a gas engine. Where there are a great number of lights running, a gas-engine would be the cheapest and the best method of driving; but where there is an intermittent number of lamps in use—say, a few at one time and perhaps a hundred at another—steam or water power is the best. In large workshops, the existing power is frequently adapted to the driving of the pressure-raisers; and for places where steam-boilers are in use, Mr. Sugg has produced a new engine, which, occupying a space of only 3 ft. 6 in. by 2 ft. and about 4 ft. high, suffices for an installation of 300 to 400 high-pressure lights. This engine is an ingenious contrivance. In devising it, Mr. Sugg aimed at constancy in operation; and experience proves that he has secured it. When we consider what this small engine will do conjoined to a gas-pressure increaser, and compare it with the machinery that would be required for giving the same amount of light by electricity, we have no fear as to which method of lighting will be in the ascendant in the future.

Reports of Gas Associations, 1901.—It will be seen by an announcement which appears elsewhere that this volume is now ready. It is the latest addition to the series of collected reports of the meetings of the Provincial Gas Associations commenced in 1883 with the object of presenting in a compact form for reference a quantity of valuable technical matter scattered over the half-yearly volumes of the "JOURNAL;" and its contents do not call for special notice. It may be mentioned, however, that the papers are illustrated by 10 folding plates and 23 diagrams and views; and there is an index. At the end of the book are the usual lists of officers and members of the Associations.

The Life of Cast-Iron Pipes.—A Transatlantic contemporary has published the following particulars concerning the life of cast-iron pipes buried in American soil. In one case a 4-inch main, in use for about 33 years in marsh mud, failed by softening of the outside, and the break took place at some air-cells in the body of the pipe. A 6-inch pipe, laid 52 years ago in soft, slaty rock, failed from softening. A 24-inch pipe, laid in well-drained, gravelly brick clay, 36 years old, failed from inherent defects in the pipe—the outside of the pipe being sound, and the inside having a coat less than $\frac{1}{16}$-inch thick. These pipes were not protected by coatings. The conclusion regarding the 24-inch pipe was that, apart from the defects in manufacture, its life might have been practically unlimited. In another case a water-pipe service was uncovered in 318 places. It was cast-iron pipe 28 years old; and it was in a perfect state of preservation,

INCLINES AND THEIR FEEDING ARRANGEMENTS

SECOND ARTICLE.

IT is not our intention to make an examination of the inclined retort system from the several aspects which it presents to view. Last week's article cleared from our notes two or three distinct matters, and left us free to deal at greater length, from quite a mass of information we have at hand, with certain of the questions which have been under discussion in these columns, without, it must be said, bringing the disputants to a single mind. These refer to the feeding arrangements of inclines, and more particularly to the relative correctness of continuous or divided hoppers. We do not presume to think that, where others have failed in producing an agreement of opinion on this point, we shall succeed; but it has been thought that an independent inquiry (starting without prejudice one way or the other), and a statement of the result, might have some beneficial effect in the way of giving those who still differ in opinion a fair and clear ground on which to further debate the points at issue.

In presenting the result of this investigation, we cannot do better than extract three passages from two recent contributions to the subject; and spin our story round them. The first is from the paper read before the Gas Section of the Engineering Congress, last September, by Mr. W. R. Herring. In the course of it, he remarked:

> The author has always been somewhat puzzled to know what train of reasoning brought into existence the central storage hopper as distinct from the continuous hopper system. As regards structural cost, it is certainly no cheaper, if as cheap; and (as already shown) it cannot be as economical in the daily operations to be performed.

Then Mr. Henry Hack, in the paper he contributed to the Midland Association of Gas Managers towards the end of the following month, describing the new inclined retort-house at Nechells, states:

> The overhead hoppers, in front of the retort-benches, are not continuous, but consist of separate receptacles, of 40 tons capacity, two to each bench, feeding the Shoubridge "even-drop" measuring chambers, of which we have two to each bench. The hoppers overhead are so placed that the travel of the chargers need not exceed three beds at any time.

But later in the same paper, in describing the large inclined retort-house which is replacing two of the horizontal retort-houses at Saltley, Mr. Hack observed:

> For this house, I also determined upon the continuous hopper arrangement in preference to the large hoppers as at Nechells; for with the latter the only advantages are more air space and saving in cost, against which there is the travelling of the chargers to and from the hoppers, and the complication of the chains in connection with the "even-feed" charger—the chains being liable to be incorrectly dealt with by inexperienced hands which we have to employ now and then; the result being the dropping of the coal on to the charging-floor.

With Mr. Hack's experience of the centralized hopper, his change of view is of importance; and, in part, it falls well as an appendix to Mr. Herring's observation of prior date—suggesting as it does, if not expressing, the same motives for the adoption of the continuous hopper, excepting in the matters of cost, and the air space obtained with the centralized hopper. But these two supposed (and in the paper, unauthenticated) benefits are obviously greatly overbalanced, in Mr. Hack's mind, by other advantages to be derived from the continuous hopper; and, in these two respects, it is more than likely Mr. Hack will admit ere long that, capacity against capacity and labour against labour, the costs of the elongated hopper are less than those of the circumscribed one, and that the former permits a more equable temperature throughout the retort-house. These are points on which, when he has had experience in the new Saltley house, his observations will be instructive.

In the meantime, it is on these contentious points that we have collected some amount of evidence, which appears to us to constitute an *argumentum ad judicium*. Weighing this evidence, it may at once be said that it is impossible to arrive at any other conclusion than that the continuous hopper has claims and confers benefits superior to those of the localized type. But we are not prepared to make such a general statement as to which is the best system for adoption between the fixed measuring-chambers (three over each bed of retorts) with light shoots, and, for each bench, three separate chargers with measuring-chambers on top, after the Shoubridge system—having, in connection with the combination shoots and measuring-chambers, a preference for the latter in comparison with the rather cumbrous triple charger such as Mr. Shoubridge has at Lower Sydenham and Mr. Hack has put in at Nechells. We do not think it can be denied that in the shot-pouch, or fixed-measuring chamber, system we have the method of charging which calls for the minimum of labour on the operators; and in this regard in large installations there is a prospective advantage which cannot be reduced, at the outset of installation, to a lump sum, and set to the credit of the system. But whether in all installations this convenience, and this reduction of labour to the narrowest possible limits, will compensate for the additional outlay, we are not prepared to say. It is a matter which each engineer must decide for himself, taking into consideration his own particular circumstances, in regard to labour, &c.

We speak with some confidence in declaring in favour of the continuous as compared with the isolated hopper for any sized

installation, and also in asserting that the method of charging is one which must be decided by a manager's circumstances. Our assurance is based on the fact that we have particulars of contract prices for work actually carried out and estimates from certain contracting firms for executing work on the three systems. We give three tables showing the costs of constructing overhead hoppers (continuous and localized), their supports, and supplying the charging arrangements for ten beds of eight 20-feet retorts. Table I. is for continuous hoppers, with fixed measuring chambers—in other words, on the shot-pouch system. This table was compiled in the writer's presence from work actually carried out, but at a time when the price of material may not have been quite the same as that now ruling. Table II. refers to centralized hoppers with Shoubridge chargers. So far as the hoppers and essential work connected therewith is concerned, the items have also been taken from actual completed work; but the cost of the Shoubridge charger is an estimate. The items are confirmed by figures obtained from a second source; and the estimate for the charger is within a few pounds of the prices from elsewhere—the figures varying between £78 and £89, including erection. But it will be noticed here that no allowance has been made (Table II.) for lengthening or strengthening the twelve buckstays and strengthening the cross-ties. Table III. is an estimate from a contracting firm who have had nothing whatever to do with the work dealt with in Tables I. and II., but have carried out work on the lines indicated in the third table. In order that the tables might be comparative, we submitted a skeleton estimate to this particular firm, with a request (without offering any explanation as to the purpose for which they were required) that they would supply the figures. This table provides the reader with the figures for the system of continuous hoppers, with three separate chargers carrying their own measuring chambers. The price per ton for the hoppers is larger in this case; but this may be accounted for by the differences caused by time in the cost of material. Little weaknesses may be found in the tables by engineers and contractors, but we do not think they will be of sufficient importance to affect the general argument.

TABLE I.—CONTINUOUS HOPPER.

For Ten Beds of Eight 20-feet Retorts.

Overhead hopper, length 107 ft. 6 in., deep 6 ft., wide 6 ft.; capacity, 114 tons; weight, 10 tons, at £15 per ton	£150 0
Thirty measuring chambers, levers, and supports, at £7 per set*	210 0
Three charging-shoots	45 0
Rails for charging-shoots	15 0
Estimates for extensions to buckstays, eleven, 16 in. by 6 in. by 63 lbs., by 4 ft. = 44 ft., 2 tons 4 cwt., at £12 per ton	26 8
Cross girders, carried on buckstays and in wall, eleven, 8 in. by 4 in. by 20 ft. = 2 tons 5 cwt., at £13	29 5
	£475 13

* The measuring chambers also afford a storage of 8 cwt. each; so that the thirty should be credited with a storage of 12 tons.

TABLE II.—CENTRALIZED HOPPERS.

For Ten Beds of Eight 20-feet Retorts.

Two hoppers, capacity, 80 tons the two; weight, 14 tons 10 cwt., at £15 per ton	£217 10
Supports for same, 14 tons, at £12 per ton	168 0
Rails for shoot	25 0
Estimated cost of a Shoubridge charging-machine (say)	95 0
Levers and rods for doors and supports for same, 12 cwt., at £2 2s. per cwt.	25 4
	£530 14

Not allowing for lengthening or strengthening the twelve buckstays and strengthening the cross ties.

TABLE III.—CONTINUOUS HOPPER, WITH THREE SEPARATE CHARGING-SHOOTS AND MEASURING-CHAMBERS.

For Ten Beds of Eight 20-feet Retorts.

Overhead hopper, length 110 ft., deep 6 ft. 6 in., wide 8 ft.; capacity, 150 tons; weight, 10 tons 12 cwt., at £21 5s. per ton	£225 0
Levers, &c., necessary for working above	28 10
Estimate for extending buckstays, eleven, 16 in. by 6 in. by 63 lbs., by 4 feet each, 44 feet in all	21 0
Cross girders carried on buckstays and in wall, eleven, 8 in. by 4 in. by 20 feet	40 5
Three separate charging-shoots and measuring-chambers	80 0
Rails for same	20 0
	£414 15

Now let us take the first two tables, and examine the items in detail. Table I. shows that the continuous hoppers for the ten beds would weigh 10 tons; and working this out at the rate of £15 per ton, we have £150. The measuring-chambers underneath, with all fixings, doors, and levers to work them from the charging-stage would cost £7 each; and three to a bed, making thirty in all, would cost £210. The point as to the storage afforded by the measuring chambers should not be overlooked. The shoots would cost £45; and the rails to carry them £15. The estimate for extending by four feet the existing buckstays, of which there are eleven in ten beds (the size being 16 in. by 6 in. by 63 lbs. per foot), is £26 8s.; there being 44 feet, equalling 2 tons 4 cwt., at £12 per ton. From the buckstays to the wall, there must be eleven transverse joists to support the hoppers. These are 8 in. by 4 in. by 20 feet long, and equal 2 tons 5 cwt., which, at £13 per ton, work out to £29 5s.

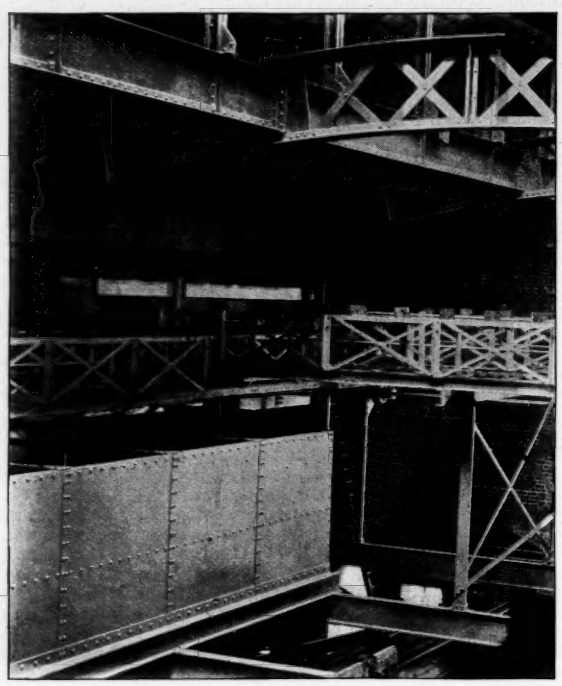
In the case of the localized hoppers (Table II.), it is necessary to have two for the ten beds of retorts; otherwise, if there were only one *centrally* situated, it would considerably increase the labour and retard operations by having to haul the chargers to and from the hopper the distance of the various beds of retorts up to the fifth. These hoppers would, or perhaps it would be better to say that hoppers which have been erected do, weigh (together) 14 tons 10 cwt.; and these at £15 per ton would amount to £217. The supports, which would be included in the hopper contract, weigh 14 to 15 tons; and, at the lower figure, the cost, at £12 per ton, totals to £168. The rails for the shoots would cost £25; the difference being accounted for by the fact that there is a greater weight to carry. We have already made an explanation in regard to the cost of the Shoubridge combination charger; but, in this table, we have taken the outside estimate given by two firms of contractors. The levers and rods for working the doors under the hoppers would weigh about 12 cwt., and are charged at 42s. per cwt. In addition to these costs, there is the lengthening of from four to six buckstays some 6 feet; and these buckstays would have, we are informed, to be strengthened, because (though on the continuous hopper system they can support the load upon them) when the centralized hopper is filled with coal, more weight is put on to the fewer buckstays. In addition, for the centralized hopper, it is quite conceivable that the cross girders also need strengthening; and those experienced in these matters speak also of the centralized hopper necessitating heavier and stronger foundations.

Respecting the third table, we need not specifically refer to the various items. There are, as previously stated, variations in the costs per ton; but the period to which the prices refer may be responsible for this. The main feature about the table is that it shows, in comparison with Table I., a lower total cost, notwithstanding the higher figure per ton for the hopper—both being on the continuous system, but the first is on the fixed measuring-chamber principle, and the third with three separate charging-shoots and measuring-chambers combined. But, bearing in mind our previous remarks as to the fixed measuring-chamber minimizing labour to the fullest extent, and also the contention of certain of our informants that the weight of the charges can be regulated with a consistency, ease, and rapidity unattainable with any other system, then it is for the engineer to decide whether the difference in the total charge, spread over the life of the plant, is or is not a good investment. It is not, of course, for us to pronounce an opinion on this point; but in an article which is intended to put the question of the feeding arrangements of inclines on a debateable and corresponding level, it would be palpably unfair not to mention these points clearly and impartially.

It is a convenient place here to say that we have no intention in this article to discriminate between the respective values of the chargers on what are known as the shot-pouch system and the Shoubridge—whether in the combination form or with the separate shoots and measuring-chambers. With both systems excellent results have been, and are being, obtained. With Mr. Shoubridge's charger, which gives an even drop to the three horizontal rows of retorts, we have witnessed, at the Crystal Palace Gas Company's works, under ordinary working, uniformity of layers not to be surpassed; but at Nechells, with the same charger, we have noticed a ruggedness quite foreign to anything that we saw at the Crystal Palace works. Then, with the same even-drop principle applied to separate chargers, we have seen splendid layers; and the same must be said of the shot-pouch chamber and shoot. With both, however, variations have been observed; and the only explanation that occurs at the moment is that differences in the class or condition of the coal is responsible. It may be observed, while on this particular point, that Mr. Hack's criticism regarding the complication of the chains in connection with the Shoubridge charger causing trouble in inexperienced hands, would not apply to the same charger divided into three distinct machines. Also that the impression, which we know is to some extent current, that the system of fixed measuring-chambers is expensive, is somewhat exaggerated. This is proved by Table I., where the cost is given at £7 per set; and the measures hold 8 cwt. of coal each. It is a point that is generally overlooked that the measuring-chambers also provide storage; amounting in the case of ten settings, as previously pointed out, to 12 tons. Beyond these few remarks upon the chargers, we have no desire to go, preferring to leave them to the judgment and testimony of those who have daily practical experience of their working.

We have interposed the last paragraph here for convenience of position; and will now return to the hopper question, which is (in regard to the constructional points still exposed to contest) of primary importance. Now it is evident from the tables already given that, per ton capacity, the continuous hoppers and supports are by far the cheaper. But we will take a larger installation, and, from estimates received from different quarters, it will be remarked that confirmation of the above assertion is obtained. We may take for our purpose Mr. Hack's installation at Nechells, consisting of 52 beds of eight retorts, divided into four benches. For these, he has eight centralized hoppers; and it will be remembered that he stated in the already quoted sentences from his Midland paper that, with these centralized hoppers, there was a "saving in cost" compared with the longitudinal ones, to which, however, be it again noted, he has transferred his affections. Now

one contractor gives a cost of £2400 for the divided hoppers, including the supports and the cost of lengthening and strengthening the buckstays. The total weight would, according to this estimate, be 160 tons; and the total capacity, 320 tons. From

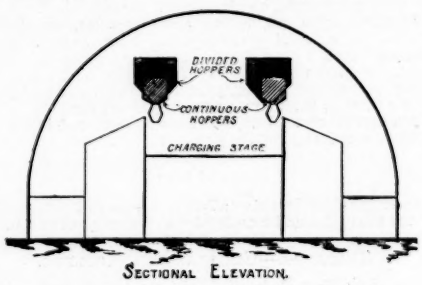


An Example of a Centralized Hopper.

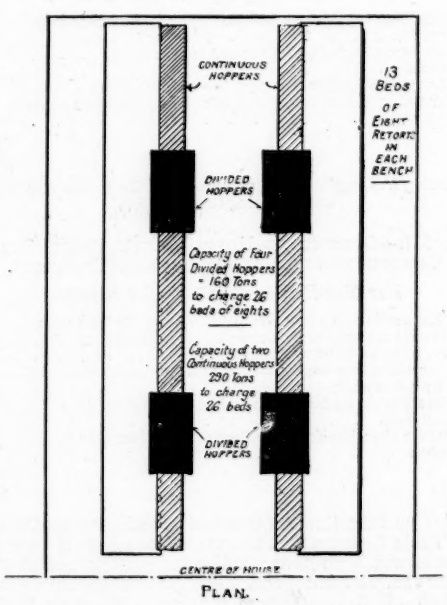
the same quarter, the price for continuous hoppers, also including the lengthening of the buckstays and the transverse ties which are fixed between the back buckstays, is given as £2295. The total weight would be about 153 tons, and the capacity 582 tons. The cost is taken in both instances at £15 per ton. From another firm comes an estimate for the eight separate hoppers, supported by girders from the ground, with a weight in the structures of only 97 tons 16 cwt., but of the same total capacity of 320 tons—the price being £1746. (It occurs to us that perhaps the explanation of the differences in weight and price is that the lengthening of the buckstays or extra cross stays are not taken into consideration. Whether or not this is so, we cannot say; but, anyway, it does not affect the argument.) On the other hand, for continuous hoppers and girders, the weight of the structure being 163 tons and the capacity 680 tons, the cost is put at £2457. These figures exclude all charging arrangements. Now these are the prices of independent firms; and neither one knew that we were in communication with the other. They vary in amount, but so do the weights, and, in the case of the continuous hoppers, the contents. However, they again conclusively prove the point that, per ton capacity, the continuous hopper is the cheaper in first cost. In the one, for a slightly less expenditure than in the centralized hoppers, there is an actual gain of 262 tons in coal accommodation; while in the other for an outlay of an extra £700 for the continuous receptacles, an additional 360 tons of coal could be hoppered over the benches. Beyond these gains, no matter what system of charging was in use, there would be a considerable lessening of the labour the operatives are called upon to perform.

There seems to be something almost paradoxical about this, that a receptacle made of similar material, but with a smaller content, should cost more per unit of capacity than a larger one. But the reason for this is not far to seek. The centralized hopper has to be constructed more strongly and heavily than the continuous one. It is called upon to do more work in a given time than any one part of the continuous hopper has to do. It is filled with, and emptied of, large weights of coal more frequently; and consequently the wear and tear upon it must be greater. Provision for this has to be made. In the continuous hopper, the weight is uniformly distributed; and the work required of any one part is confined to the feeding of the bed immediately beneath it. The concentration of the weight, too, in the centralized hopper means that so much more strength must be put into the supports, and rumour says, in some cases into the foundations of the bench itself. Equal distribution rather than concentration of heavy weights, it seems to us, is a necessity in connection with such structures as inclined retort-settings, in which the maintenance of the primitive conditions is an essential to continuous good working. Not only would a sinking of the foundations in the locality of the hoppers occasion injury to the settings and the working, but the rails on which the charger runs would be thrown out of line; and with the large combination charger such as is in use at Nechells, hard work (and correspondingly hard language) might result. The increased weight and strength of hoppers and the provision for support cost money; while the lighter build permissible in the continuous hopper and the identity of all the parts cost less *pro ratâ*. As a correspondent also points out to us: "One set of drawings is suitable not only for one job, but for almost all jobs and repetition and extension work; and this also applies to tools for pressing out the hoppers, measuring chambers, and shoots. Plant can be made quicker because standardized. In labour, we also estimate there is a great saving in making the hoppers like this, as we have not to keep a foreman continually checking the men's work, as the men get quite used to it." There is a commonsense note about this; but the same argument cannot apply to the detached hopper, which, owing to its very bulk, must be specially designed to suit the house and the conditions of situation. In the matter of erection, too, it is pointed out that it is quite an easy matter to get the longitudinal hoppers into position and riveted together from the roof principals; while, with the centralized and heavier-made hopper, special scaffolding has to be put up for erection purposes.

In addition to the saving in cost, per ton capacity, in favour of the continuous hopper, work is undoubtedly lightened by its use, and it is, if of sufficient capacity, an insurance against trouble with the elevating machinery during the hours of darkness. With the continuous, and consequently more capacious, hoppers, they can, if properly proportioned to the requirements of the house, be filled with sufficient coal during the daylight shift to meet the needs of the night shift or shifts. It seems indeed only a reasonable and an economical procedure to make such hopper provision that the coal breaking, elevating, and conveying machinery working for a few hours during one shift, at full capacity, will do all that is required for the twenty-four hours, with only the same labour as would be, under the separate hopper system, required during each shift. The work of replenishing the continuous hoppers is done continuously, instead of by fits and starts, and at the most convenient time of the day from the point of view of safety. Besides this, the spreading of the coal through the length of the continuous hopper, particularly in wet weather, must have a beneficial effect upon it, by expelling any contained moisture, and thus deliver it to the chargers in a more favourable condition for securing its proper disposition in the retorts.



Sectional Elevation.


CONTINUOUS HOPPERS
13 BEDS OF EIGHT RETORTS IN EACH BENCH
DIVIDED HOPPERS
Capacity of Four Divided Hoppers = 160 Tons to charge 26 beds of eights
Capacity of two Continuous Hoppers 290 Tons to charge 26 beds
DIVIDED HOPPERS
CENTRE OF HOUSE

Plan.

Now a few words regarding Mr. Hack's point as to one of the advantages of the isolated hopper being the increased air space obtainable. We do not think this is an argument to which any grave consideration need be given. Altogether, we find that at Nechells there are 288 of the retorts with an open space between them and the roof; while there are 128 retorts whose communication with the roof above is far more completely cut off by the large centralized hoppers than would be the case with the narrower continuous hopper. We

give a rough sketch to show the relative proportions of the two hoppers, and what would be their influence on this question of ventilation. Now so far as the men are concerned, their comfort will be best served by securing an equableness of temperature throughout the charging-floor by means of a uniformity of ventilation. It seems to us that where these large centralized hoppers are used, the worst places in regard to heat on the charging-stage will be immediately under them; and that is where the men will have to charge 128 of the retorts, and move to and from for the purpose of refilling their chargers. But in the case of the continuous hopper, under normal conditions, one part of the stage would not be hotter than another. We have often thought, in this connection, that, if the various systems of charging were judged only from the humanitarian point of view, then the shot-pouch method, which does not compel men to remain constantly in proximity to the bench, would be triumphant.

The conclusions we have drawn from our inquiry are these:

That the continuous hopper is the cheaper per ton capacity, and that it is the most advantageous system, from the structural and labour points of view.

That the system of fixed measuring-chambers and independent shoots involves the least amount of labour on the part of the operator; and that the system of divided chargers with measuring-chambers on top (after the Shoubridge system) comes next in order in this respect.

That of the two the latter system has the advantage in first cost; but against this must be set to the credit of the fixed measuring-chamber system the smaller cost of the shoots and travelling rails, the increased coal storage, and the benefits to the operator in respect of labour involved and comfort. The question of the manner in which the systems perform their duties has not been considered comparatively; nor has the point been discussed as to the relative number of men required for their operation.

Such are the conclusions arrived at, and they form a fair basis with the preceding matter for the further discussion of the subject. It is to be hoped that the trouble and care we have taken in securing evidence from different quarters, and in dissecting it, will not prove to have been altogether in vain.

WATER BILLS FOR 1902.

THE following Bills relating to water supply await the consideration of Parliament:—

The Bristol Water Bill is to authorize the construction of additional pipe lines and service reservoirs, and acquiring compulsorily certain lands required for the protection of the River Yeo. The new works are to be completed within seven years. A certain easement demised to the Company is to be made perpetual. Landowners injuriously affected by the Company's bye-laws for the regulation of their catchment area are to be compensated. New capital to the amount of £280,000 is needed, carrying 5 per cent. preference, or 7 per cent. ordinary dividends, with one-fourth loan.

The Consett Water-Works Bill proposes the construction of additional works, including a Beldon reservoir, to be formed by impounding the stream of this name in the parishes of Hexham and Allendale, an intake in a water-course known as Westerly Sike, in the parish of of Hunstanworth, and a pumping station in the same parish. Power to make a railway for construction purposes is asked for. The compensation water to be discharged down the Beldon Burn is 1000 gallons per minute for 156 days in the year, as the millowners may select. The authorized works are to be completed within ten years. Additional capital to the amount of £360,000 is required, with one-fourth loan. Authority is sought for the amalgamation of the undertaking with that of the Weardale and Shildon District Water-Works Company, or for the Companies to take water from each other. Consumers' fittings are to be inspected and stamped.

The Devonport Water Bill is to authorize the construction by the Company of additional reservoirs, principally at Beardown, in the parish of Lydford, for impounding the waters of the River Cowsic. The necessary lands are to be acquired compulsorily within five years, and the works completed within fifteen years. The time allowed for the completion of certain works authorized in 1889 and revived in 1897 is to be extended to 1905. Clauses of the Company's Act of 1793, relating to the supply of water to the Royal Dockyard, are to be modified. Additional capital to the amount of £400,000 is required, to bear 5 per cent. dividend; with one-third loan.

The Devonport Corporation (Water) Bill is to authorize the Corporation to purchase the undertaking of the Devonport Water Company. Notice to treat is to be given within six months after the passing of the Act; and the Manager is to be compensated in respect of any direct pecuniary loss he may sustain by the transfer. There is nothing special in the terms of the Bill.

The East Worcestershire Water Bill is to authorize the Company to extend their limits of supply over the parishes of Feckenham, in Worcestershire, and Ipsley, Studley, and Sambourn, in Warwickshire—such supply to be made effective within five years. Additional land is required for the erection of a water-tower. Outstanding interest in lands reputed to belong to them, and works constructed thereon, are to be confirmed. The new works are to be completed within five years. Additional capital to the amount of £20,000 is required, with one-fourth loan. Section 41 of the Act of 1877 is to be amended, by the Company being now relieved of the obligation to supply by meter except through such meter as the Company may reasonably prescribe or approve. And if the Company have reason to suppose that any meter not belonging to them is "erroneous or unsuitable," they may require it to be changed. The Company may also exercise the right of connecting and disconnecting meters. Certain agreements with local authorities are scheduled for confirmation.

The Finedon Urban District Water Bill is to empower the Council to supply water to their district. The works are to comprise a pumping-station, a covered service reservoir, and a water-tower. The works are to be completed within five years. The rates for domestic supplies are to range from 10 to 7½ per cent. The sum of £13,550 is required to complete the works already in hand, and a further sum of £2000 is needed.

The Grand Junction Water Bill is to empower the Grand Junction Water-Works Company to extend their limits of supply to include the parish of Sunbury (Middlesex). Surplus lands at Campden Hill, Kensington, are to be sold. The provisions of section 89 of the Companies Clauses Consolidation Act, 1845, are to be adopted in regard to the filling of occasional vacancies in the office of Director. Additional debenture capital, amounting to £200,000, is required, to be raised by redeemable issues, and applied for extensions of mains and services.

The Higham Ferrers and Rushden Water Board Bill is to constitute and incorporate a Joint Water Board for the places named, to take over the powers of the Higham Ferrers Water Act, 1900. The powers of the Company under this Act are to be exercised by the Board, who are to pay £1250 towards the cost thereof. The existing water-works at Rushden, which are inadequate to the demands, are to be transferred to the Board one month after their own works are in a position to supply. Additional works are to be constructed, consisting of a pipe-line and a service reservoir, to be completed within five years. The rate for domestic supplies is to be 7½ per cent. The Raunds District Council are to be supplied in bulk, at the price of 9d. per 1000 gallons. The sum of £40,000 is to be borrowed for old water-works purposes, £42,000 for the purposes of the Bill, and £5000 for extensions and improvements.

The Kent Water-Works Bill is for empowering the Company to raise £300,000 by the issue of redeemable debenture stock. The City Chamberlain's sinking fund is to be applied to the new creation of this stock. The limits of supply are to be extended to cover part of the parish of Tatsfield. Power is desired for the sale of water in bulk within or beyond the limits, and to take over the private works of the owners of the Westerham Hill Park Estate.

The Limpsfield and Oxted Water Bill is to enable the Company to make additional water-works, including a pumping-station in the parish of Tatsfield and a new service reservoir in Limpsfield parish, to be completed within five years. The limits of supply are to be extended to include the parish of Cowden. New capital to the amount of £40,000 is needed, with one-fourth loan. Permission is sought for supplies in bulk beyond the limits.

The London Water (Purchase of Companies) Bill of the London County Council is practically the measure of last year re-introduced and corrected to date. It proposes to make the Council the new Metropolitan Water Authority contemplated by the Royal Commission of 1897. The amount of the purchase money is to be ascertained by arbitration, in which allowance is to be made for the cost of reinvestment by reason of the compulsory purchase. The value of the debenture stock is to be determined by arbitration. Removed officers are to be compensated. The Staines Reservoirs Joint Committee is to be dissolved. The undertakings are to be managed by a Committee, which may contain members not belonging to the Council. Extra-metropolitan authorities are to have the option of purchasing their portions of the undertakings, or to be supplied in bulk.

The Newcastle and Gateshead Water Bill is to empower the Company to construct an enlarged reservoir on the River Rede, to be called the New Catcleugh Reservoir. Additional service tanks are also to be constructed at Byker. The new reservoir is to be substituted for the authorized Catcleugh Reservoir of 1894. The works are to be completed within ten years. The purchase of the estate of Lumsden is to be confirmed. It is proposed that the Company, and the owner of any lands which their pipes can supply, shall be empowered to make agreements accordingly, subject to the consent of parties having statutory rights of supply in the district. The capital of the Company is to be consolidated and converted into 7 per cent. ordinary and 5 per cent. preference stocks. Additional capital to the amount of £480,000 is required, with one-third loan.

The North Warwickshire Water Bill is to provide for the better definition of the terms of transfer by the North Warwickshire Water Company of a portion of their undertaking to the Corporation of Coventry. It is recited in the preamble that, by the Act of 1898, it was provided that if within seven years the boundaries of the City of Coventry should be so altered as to include any portion of the parishes of Foleshill and Stoke, supplied by the Company, such portions of the undertaking might be acquired by

purchase by the Corporation. This condition has come about, and the Corporation have taken action accordingly; but the provisions of the Act of 1898 are found to be uncertain and incomplete as to the terms of purchase. It is now proposed that the transfer shall be completed on the last day of a quarter. If the transaction should not be completed on the appointed day, the Corporation are to pay 10 per cent. interest during the delay. If such delay extends over three months, the transaction is to be cancelled at the expense of the Corporation. The amount of the purchase money is to be treated as capital, with the exception of one-fifth, which may be distributed among the shareholders. The Company's limits of supply are to be extended to the parishes of Church Lawford and Long Lawford, both in Warwickshire. The several periods limited by the Company's Act of 1900 for the compulsory purchase of lands and the execution of works are to be extended. Additional lands are required. Section 35 of the Water-Works Clauses Act, 1847, is not to apply to the Company. Notwithstanding anything in the Acts of 1898 and 1900 and this Bill, the Company may require the provision of cisterns by consumers, and refuse to supply without them.

The Street Urban District Water Bill is to empower the Council to construct water-works for the supply of the district, in Somersetshire, together with parts of the neighbouring parishes of Meare, Walton, and Rodney Stoke. The works comprise a well at Rodney Stoke, and a pumping-station at Street. The source of supply is the water of the Stoke Brook. The works are to be completed within seven years. Rates for domestic supply range from 9 to 7 per cent. A capital of £30,000 is required for water-works purposes.

The Ticehurst Water Bill is to incorporate a Company with a share capital of £18,000 and power to borrow £6000, for the supply of a district comprising the parishes of Ticehurst, Wadhurst, Burwash, Salehurst, and other places adjacent, in Sussex. Wadhurst comes within the district included in the Crowborough Act of 1897; but has not been supplied, and it is proposed to repeal this part of the Act. If the Company do not supply any parish within five years, their right is to lapse. The source of the supply is to be wells and pumping stations in the parishes of Wadhurst, Ticehurst, and Etchingham; and the works are to be completed within five years. Rates for domestic supplies are to range from 10 down to 6 per cent.; inns to be chargeable on the highest scale. Water required for general farming purposes is to be charged for by meter, at the maximum price of 2s. per 1000 gallons.

The Weardale and Shildon District Water-Works Bill is to authorize the construction of a new reservoir in the parish of Stanhope to be formed by damming the Burnhope Burn, and a second reservoir, to be called the Bishop Oak Reservoir, upon the Waskerley Beck. The waters of several streams are to be collected by these works, under stated conditions in respect of the discharge of compensation water during the first filling of the reservoirs and afterwards. The necessary lands are to be purchased compulsorily within five years, and the works completed within fifteen years. Tram roads are to be authorized for construction purposes. Additional capital to the amount of £360,000 is required, with one-fourth loan. Working agreements or amalgamation with the Consett Water-Works Company are to be sanctioned.

The West Hampshire Water Bill is to extend the limits of supply by the Company to include the district assigned to the Barton Company in 1899, and the town of Lymington, by reason of the fact that the Barton Company have not been able to find a proper supply. Power is sought to supply in bulk the County Council of Hampshire, and the Corporations of Christchurch and Lymington. The Company require £50,000 of additional capital, to bear 7 per cent. ordinary or 5 per cent. preference dividend. Three hundred ordinary £10 shares are to be issued as fully paid-up, in repayment of the expenditure on the Barton-on-Sea scheme. Certain powers under the Barton Act are to be transferred to the Company, and the rest are to be cancelled. No capital was raised under the Act in question, and the persons interested have given their consent to its being dropped on the terms stated.

The Whitstable Improvement Bill proposes to transfer the property of the Company to the Council, who are to carry on the undertaking on the basis of a 7½ per cent. rate. Besides the cost of the purchase, £10,000 is to be borrowed for water-works purposes.

The Wrexham Water-Works Bill is to enable the Company to construct an additional storage reservoir in the parish of Esclusham Above. Certain road diversions are necessary. The waters to be taken are those of the Pentrebychan Brook and its tributaries, subject to the provisions as to compensation water of the Act of 1874. The works are to be completed within ten years. Additional capital to the amount of £48,000 is required, with one-third loan. The preference shares and stock of the Company are to be consolidated. From and after the passing of the Act, the name of the Company is to be the "Wrexham and East Denbighshire Water Company."

The Ystradfellte Water Bill is to empower the Neath Rural District Council to obtain a supply of water from the River Tringarth, in the parish named, which is to be dammed for the purpose. The necessary land is to be acquired within five years, and the works completed in ten years. Compensation water is to be discharged at the rate of 1,678,500 gallons per day. A loan of £162,300 is required for the purposes of the Bill.

ELECTRIC LIGHTING MEMORANDA.

The Government and the London Telephone Service—A Peculiar Economic Law—Factious Opposition—The London County Council's Bill for Purchasing the Metropolitan Electricity Generating Stations.

AFTER all the uproar that was made in some newspapers, for political motives, over the alleged "telephone betrayal" entered into by the Post Office, the House of Commons refused to censure the Government for making the arrangement which has several times been referred to in this column. The chief reason why we have taken so much notice of the affair, as has been explained, is because it throws light from a fresh quarter on the economics of central supply undertakings and services. Mr. Austen Chamberlain told the House in the course of the debate initiated by the Lord Mayor, that an exchange telephone system is subject to the "law of diminishing return;" and not one of the critics of the Government faced this point. Neither has it been regarded by any of the newspapers which have affected to see in the Government proposals a surrender to the National Telephone Company. The result of this blindness to the determining factor of the economic problem has been to leave those who are smitten with it confounded before their opponents. The incident is besides a valuable lesson in the impotence of political parties and a partisan press, in face of a bit of incontrovertible truth. Government by party is all very well so far as it goes, and it is at any rate the most interesting way of demonstrating the affairs of the country. But the Government of a civilized nation exists in order to carry on the national business; and therefore it has to take account of facts, which irresponsible hostile prejudice permits itself to ignore.

There has been a good deal of controversy of late years in every organ of public opinion (the "JOURNAL" included) over the so-called laws of political economy. There was a time, covering about the years when the present generation of men of affairs were at school, when it was very much the fashion to call by the name of "laws" a vast number of deductions from physical and social phenomena. The budding intellects of that generation of schoolboys and collegians were stuffed and circumscribed by these "laws," until it would have been regarded as heresy in them to question the generalization of the smallest prophet of the Manchester School, of which the late Robert Lowe was such an accredited leader, and the "Free Breakfast Table" the ultimate expression. Naturally the reaction that has followed, although it did not send all political economy quite so far as the planet Saturn, made great havoc with all this ponderous structure of "laws," reducing most of them to their proper grade of inferences. Clerk Maxwell defined the change of thought of later philosophers and economists, when he declared that the only "law" he could perceive in phenomena was that "the greater force controlled the less." This is a great saying; but its application to specific matters is sometimes very arduous—the distance to be traversed from the general to the particular being considerable. One is consequently grateful to be told of the existence of even one law of economics which has not so far to go to its everyday work. Of such is this unfamiliar law of diminishing return, which has come down upon many members of Parliament, and most newspapers, with crushing effect. The only possible way of meeting the citation of such a law is to challenge its existence, which was not done in the case in point, and so it prevailed.

In commenting upon the parliamentary debate, our excellent contemporary the "Electrical Review" very aptly remarks that "in this matter the House of Commons seems to have shown itself a more businesslike body than the conference of local representatives which Sir James Dimsdale (the Lord Mayor) called a gathering of business men. The business men did not know the subject, and apparently they were unwilling to learn." Perhaps some of them have since begun to perceive that such leading lights of business and local government as Mr. Alpheus Cleopas Morton, and Mr. J. W. Benn, are more like the traditional Will-o-the-Wisp than a safe beacon to the true path in such affairs. These questions of central station supplies belong to a special branch of economics which the "man in the street," who is popularly supposed to be the ideal London County councilman, cannot properly be expected to understand. The mischief is that, under the present-day fashion of municipal dabbling in trade, he is supposed to understand them. When the Middlesex County Council the other day refused to undertake the responsibility of working their own tramways, they were roundly abused by the favourite journals of Municipal Progressivism for this exercise of their discretion. The "man-in-the-street," if only he can call himself a county councillor, is deemed to be quite competent to administer in his spare time all the tramways, and telephones, and electric lights of London or any other place. It is a humorous idea.

Actually, the London County Council have a Bill in Parliament to enable them to purchase all the generating stations of Metropolitan Electricity Supply Companies, which are not liable to purchase under the Electric Lighting Acts. This project of legislation is to deal with the conditions created where one company supplies more than one local authority, and where generating stations are established for the supply of electricity in bulk to authorized undertakers for distribution. In some circumstances, the Metropolitan local authorities would have the first claim to

purchase; but in the event of their failing to rise to the height of their opportunity in this regard, the County Council would graciously step over their head and exercise the power. It is thoughtfully provided that any profits which may be realised by the local authorities under such arrangements shall be divided up among them. Who is to bear any loss that may occur is not stated, with the exception of the case of the County Council itself, which is to charge any deficit to the county rate. It is a sweet scheme, redolent of Spring Gardens.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 293.)

BUSINESS was brisk and cheerful in the Stock Exchange last week. The air was full of rumours of peace, and there was an undefinable but possessing conviction that peace was close at hand, although this or that story might be erroneous. Thus everything was buoyant with hope. Consols rose steadily, any quantity of money came forward to take up gilt-edged issues, and the rush to buy "Kaffirs" was almost too big to cope with. Other things profited sympathetically; and the result was that prices advanced all along the line. The Money Market was active and firm in response to demands in connection with the fortnightly settlement and other requirements; but discount rates showed a marked tendency to greater ease. In the Gas Market, taking one day with another, business was in the aggregate no more than moderate, and at times it fell quiet indeed. But it was not devoid of interest, being sufficient to afford evidence of a good general tendency. No large advances in quotations were made; but a fairly numerous array of rises of moderate degree is almost unchequered by a retrogression. So far as London and Suburban accounts for the last half of 1901 are to hand, they appear to show a fair increase in the sale of gas generally, coupled, of course, with reduced expenditure on coals, &c. On the other hand, the augmented profits have been diminished by bad markets for residual products, especially coke. In Gaslight issues, the ordinary had a further recovery of a point in the quotation; and transactions throughout the week commanded steady figures. The secured issues were quiet, but strong; and the maximum rose nicely. South Metropolitan was firm; and at first it was active, but fell quiet later on. Nothing was done in Commercials. In the Suburban and Provincial group, business was at a very low level in point of activity; but the general tendency was firm. Southampton underwent readjustment; the ordinary going up, and the debenture going down. In the local markets, Sheffield and Liverpool had slight advances. Business was very slack in the Continental Companies; but they were just as firm as the rest, and Imperial had a good advance. Among the remoter undertakings, River Plate debenture was slightly higher. Business in the Water Companies was somewhat remarkable. The tendency at first was very uncertain; and some issues rose and others fell most irregularly. But towards the end of the week, the flood tide set in strongly, and quotations rose by leaps and bounds.

The daily operations were: Gas opened briskly in Gaslight ordinary and South Metropolitan; and the former rose 1, and the latter ½. Southampton gained 2, and River Plate debenture 1. In Water, East London fell 1, and Lambeth debenture 2; but New River and East London debentures advanced 1. Gas was quiet on Tuesday, but still strong. Gaslight maximum improved 1, and Imperial 1½. In Water, New River fell 5, and Lambeth 1; but Chelsea improved 2. On Wednesday, South Metropolitan moved up ½, and Imperial 1; but Southampton debenture fell 3. Gas was still quiet on Thursday. Gaslight maximum and South Metropolitan debenture rose 1, and Cape Town ½. West Middlesex Water gained 2½. Future changes were all in Water. On Friday, West Middlesex rose 7½, and Southwark 7. On Saturday, West Middlesex went up 10, Lambeth 10⅓, New River 5, and East London 3.

Mr. D. Purves, the Convener of the Works Committee of the Edinburgh and Leith Gas Commission, has been presented with his portrait in oils, by the members of the Edinburgh Burgess Golfing Society, in recognition of his services to the club, which dates back to 1736. Mr. Purves was Honorary Secretary and afterwards Captain of the club. The portrait is to hang in the club-house.

At an installation ceremony, in connection with St. Laurence Lodge, held at the Masonic Hall, Northfield, on the 27th ult., Bro. Joseph Hull, S.W., was installed as Worshipful Master for the ensuing year. The new W.M. is known to many of our readers as the representative of the Eveson Coal and Coke Company, Limited, of Birmingham, with whom he has been associated for fourteen years.

We have received from the Secretary of the Institution of Gas Engineers (Mr. Thomas Cole) the circular-notice of the annual general meeting, which will be held at the offices on the 15th inst. As usual, only formal business will be transacted, including the election of President, Vice-President, and members of Council (to replace those retiring by rotation), Honorary Secretary, and Auditors, and new members and associates. The meeting will then be adjourned till the 30th of April, at the Institution of Civil Engineers, when the papers and communications will be read and discussed.

PERSONAL.

The vacancy caused at Longford by the appointment of Mr. W. A. Reid, the Manager and Secretary of the Gas Company, as District Superintendent at the Malta station of the Malta and Mediterranean Gas Company, has been filled by the selection of Mr. W. E. YOUNG, Manager of the Bagnalstown Gas Company, as his successor.

Mr. SAMUEL SHADBOLT, who has been acting as Works Foreman under his brother at the Grantham Gas-Works, has been appointed to the management of the Biggleswade Gas-Works, which position, as already noticed, has been vacated by Mr. G. R. Casterton on his selection for the managership of the Melton Mowbray Gas-Works.

As mentioned in the "JOURNAL" last week, of the forty-four candidates for the post of Gas Engineer and Manager at Middleton, in succession to Mr. Tim Duxbury, the Gas and Electricity Committee had selected six for further consideration. One of them was Mr. E. E. J. ANDERSON, of Ripon, who has obtained the appointment. The successful candidate was formerly Assistant-Manager at the Maryhill station of the Glasgow Corporation, and went to Ripon towards the close of 1897. He was elected a member of the Manchester District Institution in the spring of the following year. We cordially wish him prosperity in his enlarged sphere of labour.

In connection with the death of Mr. G. Henderson, the late Chairman of the Plymouth and Stonehouse Gas Company, we learn that Mr. W. J. FITCH is now the only survivor of those who were officially connected with the present Company when the amalgamation took place in 1849. Mr. Fitch was Distributing Superintendent for 50 years, but was obliged to retire from active service in 1899 owing to a long and severe illness. At the time referred to, the bulk of the gas consumed in the two towns was manufactured at the old Company's works in Phœnix Street, Millbay. This continued until 1856. The price of gas originally was 6s. per 1000 cubic feet; but in 1856 it was reduced to 5s. The late Mr. Peter Adams was then Chairman, Mr. George Henderson, Secretary, and Mr. John Lack, Engineer.

We learn that the Directors of the Tottenham and Edmonton Gas Company have appointed Mr. JOHN TERRACE, son of Mr. D. Terrace, of Middlesbrough, as Assistant Engineer, in succession to Mr. T. Randolph Murray, who, as announced last week, is leaving to take the position of Resident Superintendent at the Nechells Gas-Works, Birmingham. Mr. Terrace has been with Messrs. Humphreys and Glasgow since September, 1898; and previously he was engaged in construction work by Messrs. Ashmore, Benson, Pease and Co. During the time he was with the first-named firm, he was occupied in the operation and erection of carburetted water-gas plant. In construction work, he had sole charge of the installations at Maidenhead (500,000 cubic feet), Hartlepool (850,000 cubic feet), two plants at Sydney, New South Wales (500,000 cubic feet each), and Australia (200,000 cubic feet). On his return journey from Dunedin and New Zealand, Mr. Terrace visited America, and studied the gas manufacturing methods in operation there. The conscientious manner in which he performed the duties entrusted to him won for him the confidence of the firm, who, while pleased at his upward progress, sincerely regret his departure from their service. It will be seen from what we have stated that Mr. Terrace enters his new sphere of labour equipped with an excellent, varied experience; and he will take with him the good wishes of his old colleagues and the numerous professional friends of his father. We add ours, and at the same time congratulate him on another important change in his life. To-morrow the marriage ceremony which will unite him to Miss May Dennington takes place at St. Peter's, Middlesbrough; and to both bride and bridegroom we offer our hearty felicitations.

OBITUARY.

Herr J. FÜHR, Manager of the gas-works at Glogau, in Silesia, died on the 12th ult.

Herr H. JOORS, constructor and owner of several water-works in Germany, has recently died at Wiesbaden.

The death is reported of Herr R. FLOSKY, Manager of the gas-works at Sagan, in Silesia, on the 5th ult. He was a member of several technical associations, and the inventor of the burner which bears his name, in which the gas is heated prior to combustion, as well as of a wind-proof lantern for incandescent lamps. He was one of the first to interest himself practically in the enrichment of gas by carburetting.

Lesmahagow Gas Coal.—Referring to the article on this subject which appeared in the "JOURNAL" for Dec. 31 last, we learn from Mr. A. Cameron, of Glasgow, that he and his partner, the late Mr. Walker, of the Haywood Gas Coal Company (previously owned by the late Mr. Hugh Bartholomew), purchased the last "bing" of the Lesmahagow gas coal, which was a stock of about 5000 tons, and for which they paid 40s. per ton. They also bought at about the same time a "bing" of the Wee Lesmahagow of about 1000 tons, all at Auchenheath, in the parish of Lesmahagow. The same gentleman also stated that the Haywood gas coal is likewise worked out.

NOTES.

Filtration of Oil From Exhaust Steam.

Speaking at a meeting of the New England Cotton Manufacturers' Association, Mr. F. H. Boyer dealt with the subject of the economy of water in the working of steam power plants, and the separation of oily matter from exhaust steam. The author declared his adhesion to what he called the positive filter system, in which the steam is passed upwards through a box filled preferably with coke. The thickness of the film of oil which is deposited does not exceed $\frac{1}{33}$ inch, for which reason it is necessary for the attainment of a good result that the filter should be of sufficient capacity. In practice, these oil-separators are built either of boiler plate or cast iron, strong enough to withstand the atmospheric pressure due to the existence of a vacuum within; for they come between the steam cylinders and the condensers. In size, they vary from 2 to 6 feet in diameter, and from 6 to 16 feet in length. By using coke or wood blocks in these vessels, the clogged material can be burnt under the boilers, where it forms a valuable fuel. The steam should leave the top of the separator quite free from oil.

Thrupp on the Flow of Water in Pipes.

Mr. Edgar C. Thrupp has investigated a phenomenon of the laws of motion of water in pipes, which he considers to have an important bearing upon such problems. It is that there is an enormous divergence from the laws of stream line motion as enunciated by Poiseuille, Osborne-Reynolds, and others, when the dimensions of the channels or pipes are such as to have hydraulic radii exceeding 1 inch or 2 inches. It is well known that water moving in small pipes experiences frictional resistance which is approximately proportional to its velocity. At a certain critical point the nature of the motion changes, and at higher velocities the resistance varies as v^3 or v^4 or thereabouts, and at still higher velocities the ratio becomes more constant and the resistance is generally proportional to $v^{1.8}$ or v^2. Professor Osborne-Reynolds investigated the phenomenon of the "critical point," and has laid down the law that the critical velocities for pipes of different dimensions vary in simple inverse proportion to the diameters or hydraulic radii. Mr. Thrupp has proved that this "law" relates only to an extremely limited range of conditions, if it can be regarded as a law at all. The experiments show that when the hydraulic radii are greater than 2 inches, the critical velocity increases with the hydraulic radius.

The Durability of Brass Lacquers.

Some valuable experiments on the capability of lacquered brass goods to bear exposure to light were published by Mr. Harry Smith at a meeting of the Newcastle Section of the Society of Chemical Industry. It is well known that polished brass tarnishes speedily with exposure to air, and the tarnishing is increased in an atmosphere laden with the products of the combustion of gas. In order to protect bright brasswork from this effect, it is very generally hot lacquered, with a solution of of seedlac in methylated spirits. Mr. Smith wished to ascertain whether the colour which is usually added to the lacquer, in order to impart a richer look to the brass, fades much in sunlight. Accordingly, he exposed a number of lacquered tubes, coloured with different dyes, under a skylight with a full eastern aspect, keeping them there a whole year. As the result, it was found that the vegetable colouring matters turmeric, sandalwood, saffron, dragon's blood, and annatto, all faded completely. In addition, turmeric, saffron, and annatto, turn the lacquered brasswork black. The aniline colours, metanil yellow, auramine, and primrose, are better for colouring yellow lacquers than turmeric, saffron, and annatto, as they do not blacken brass. Gamboge is better still, as it scarcely fades at all, and does not blacken brass. Dragon's blood is the best copper colour for lacquer.

Danger of Incandescent Electric Lamps.

It is pointed out by the "Lancet" that a dangerous amount of popular misunderstanding exists in regard to the heating effect of ordinary incandescent electric lamps. As a result, we often see these lamps in shop windows in close proximity to highly inflammable goods, and in domestic interiors they are not infrequently placed very close to hangings and thin woodwork. As a matter of fact, the incandescent electric lamp does give out a good deal of heat, especially when it is of cheap manufacture. The whole of the energy of the current which the incandescent filament obstructs, and consequently changes into visible radiation, appears as either heat or light; and only 6 per cent. of it is in the form of useful light. While the amount of heat radiated from an incandescent electric lamp is much less than that of a gas-flame of equal illuminating power, it is an appreciable quantity, and quite competent in the long run to provoke the ignition of readily inflammable substances in contact with, or in close proximity to, it. A proof of the heating power of these lamps can easily be had by plunging them in water. A 16-candle-power bulb will boil half-a-pint of water within an hour. That most dangerous of stuffs, cotton wool, scorches, and eventually bursts into flame, in contact with the lamps; and all forms of thin celluloid, so largely used for toys, will ignite under the same conditions in a few minutes. Sometimes such a burst into flame is attended by explosion of the lamp.

COMMUNICATED ARTICLE.

CRITICISMS ON CONSTRUCTION OF COAL AND COKE HANDLING PLANT AT ZURICH GAS-WORKS.

By Archibald Little.

The presentation to the gas industry by the "Journal" of the descriptive illustrated articles on the new Zurich Gas-Works showed a most creditable endeavour to keep readers informed on all innovations in gas plant, including either the introduction of novelties or the change in methods of working established principles. The opportunity is not often given for studying the plans in so much detail; and there is no other paper published which has conferred equal benefits on the members of the profession with which it is connected.

Having recently visited a number of gas engineers in different parts of this country, I could not help observing how gratified they all appeared at having the information to hand; and several expressed the hope of being able to visit Zurich, and see the plant at work. What struck me as most astonishing, however, was the readiness with which the whole scheme was admired, and the numerous expressions of approval which were forthcoming anent the conception, although it became quite apparent that the majority of the gentlemen who talked on the subject had all been too busy with their regular work to make anything like a study of the articles.

Regarding the proposition that a criticism of the arrangements should be made by a competent hand, and read as a technical society paper, it is to be hoped that this will not be attempted, as it might, unfortunately, lead members into a discussion—carried on perhaps under a misapprehension, or through some misreading of the articles—which would not bring much new light to bear on the advisability of adopting similar methods in this country. At the same time Herr Weiss would not have an opportunity of answering criticism there and then, or of putting forward further information which, in some cases, would be requisite. A better idea would be to publish sectional papers, to discuss details, and on no account should this be attempted by one man, who, of necessity, if acquainted with the whole of the trades which enter into the building of a gas-works, especially of such a works as the one under notice, would only be superficially informed about either. Consider the manner in which the Nineteenth Century has multiplied the trades interested in gas projects, and further, the way in which trades have been sub-divided into sections. Could an exhauster maker tell you, for example, what sort of conveyor would be best for the carrying of coal? or a washer-scrubber maker design or supply the best type of generator for electrical power? Yet these and many other trades are really only sections of the "engineering branch;" and it must be admitted that this comprehensive term does not cover the trades which are represented in the installation of the coal-carbonizing plant at Zurich. The publishing of criticisms such as I have indicated would benefit the whole profession in this country, and would doubtless be well received by Herr Weiss, as a guide to him and his confrères when extending the works. The "American Machinist" some two years ago pointed out that "it is generally conceded that Germany's recent advance has been largely the result of frank criticism—particularly by Professor Renleaux; and there is no reason to suppose that similar frank criticism will not have a similar effect in Great Britain." With this aim, the writer proposes to thoroughly investigate the question of suitability in design of the coal and coke conveying machinery in its situation at Zurich, and its adaptability for similar duty in like places at other towns.

It is not out of place to consider the introduction of material transmitters. This is of recent origin, and contrary to accepted notions was not the outcome of "American ingenuity," though it is a painfully obvious fact that, with perhaps the one exception of gas-works, the application of labour-saving machinery is regarded by a larger number of manufacturing firms in other countries than on this side, as an asset of considerable value, with the result that the adoption by our competitors in the world's markets, of applicances to move matter labourlessly, is carried out with commendable promptitude. It has been my privilege to accompany a number of European and American engineers (especially those connected with the gas industry) over some of the best gas-works, to inspect the appliances and methods which obtain in England; and it is encouraging to hear their remarks on the various constructions. One gentleman from Pittsburg stated that, without doubt, there was not a gas-works in the States that would compare favourably with the one inspected at Middleton, Lancs. On his return, he wrote to say he had again inspected works on his side, and was astonished at the class of work which constructors there foisted on gas managers as samples of the best practice in the remodelling of retort-benches and coal-handling machinery. Evidence, moreover, is forthcoming daily as to the manner in which British principles are being copied in the same country—repeat orders being numerous.

Reverting to the works under notice, it must be said that they are well designed, although this discussion will show why some of the principles are clearly open to adverse criticism.

In the preliminary remarks anent the description, the Editor

writes that: "Needless to say," the inclined-retort system has been adopted. I wish, as these words seem to suggest is the case, it could be said of gas engineers generally that they had now accepted the principle of sloping retorts. Doubtless the best men in the profession have at last agreed to personally and thoroughly try the charging of retorts by gravity; but, speaking generally, the accuracy and economy with which incline-retort installations can be erected and worked is not accepted by many of the managers. In Scotland, for instance, it is only recently that Aberdeen put in inclines; and the only other North Country installation is the one at Edinburgh.

Dealing now with the taking of coal from trucks, and placing it in stores. Considering the various points raised against the use of overhead railways running into stores, or the modified arrangement of truck-lifts, it is difficult to understand why in this country the idea is so favoured and extensively adopted. The system that was decided upon at Zurich is undoubtedly a good one; and it has proved a satisfactory method in many situations. But I believe it was an accepted principle that the best way to handle crushed coal in quantities was by continuous small loads at quick speed. In 1897, Mr. W. R. Herring, of Edinburgh, wrote: "I am convinced that the best method of transporting large quantities of material is to do it in small quantities, and not by attempting to shift it in bulk. Let us take a works which will receive its coal in waggons at one point only, discharging it into coal-breakers, and, by a simple system of elevators and conveyors, conducting it throughout its entire system. In this case a minimum of material is employed for the structure, and no additional cost is incurred in strong gangways and railways. The structure and overhead waggons must be enormously strong to carry the large moving load, large quantities of room are taken up, and, in the end, the purpose is only accomplished at considerable labour and cost."

The railway trucks at Zurich, I notice, are hauled alongside a breaker, which has to deal with two lines of rails. In the position of the breaker, the coal must be fed into it by shovelling, which entails the use of hand labour. It also keeps the truck in occupation of the line till it is emptied; and, doubtless, the locomotive has to be kept in attendance to move the truck, and keep its full part in line with the coal-breaker mouth. It is stated in the description that, on bringing the coal-trucks over the hoppers, they are, on the opening of the sides, to a certain extent automatically emptied; but this, it appears, would only be possible if the coal was dumped into the large subtruded hopper, as the funnel of the coal-breaker is slightly above the level of the bottom of the truck, and some feet from its side. At the beginning of the description, it is asserted that the coal passes first of all through the breaker which has a capacity of 20 tons per hour. There is only one breaker shown; but presumably there is one to each elevator. Why is the capacity only 20 tons per hour, when the elevator lifts 30 tons to feed the truck with a capacity of 30 to 40 tons an hour? In the preliminary remarks, it is stated that all the machinery is in duplicate; but this must be a slip, as none of it is in duplicate in this section of the works.

If all the coal passes through the crusher, what is the object of having the large hopper between each double line of rails? If it is meant for a small store to hold surplus coal (should the lift miss one or two journeys), it is badly designed, as the coal would not automatically discharge at the angle shown, especially as at times the coal must be wet through exposure to rain and snow in its progress from the pit mouth to the hoppers. Then, again, why is the hopper extended right across to the opposite side of the coal truck? This appears to me to be useless hopper space, if the coal really goes through crusher. I should like to know, too, what is the object of being able to empty six waggons at once; as, if coal passes through three breakers at a rate of 20 tons per hour each, this equals 10 tons per hour per waggon; and if the six are, to a certain extent, automatically emptied, where are the storage tanks over the crushers to catch and hold the 30 tons which are deposited on to the crushers. The hoppers are made of 3 mm. (0·118 inch) thick sheets, which is just under ⅛ inch; and it is rather a misnomer to call these "strong sheets," considering the size of the hoppers, and their duty. Nothing less than ¼ inch would be used in this country.

I should like to have particulars of the vertical hopper-door which is said to work so easily. In my opinion, a better door is made to cut off radially, like those put in at the Charing Cross electric station, and similar to those which Sir William Arrol and Co. now use for hoppers feeding charging-machines, and the C. W. Hunt Company put on to their coal-pockets. Sliding doors cannot be shut with a load on, without risk of breakage to the gearing.

No details of the jib of the lift are given, but it is specified as being of light design. There is no doubt about it being light; and it is doubtless after the pattern of a similar jib which had to be reconstructed in the States, as most of the rivets gave way, although it appears even less substantial. The jib arrangement is a capital idea, when the path is built on a well designed and mathematically accurate parabola, of sufficient strength.

The three elevators with a capacity of 20 tons per hour each from the breaker, would deal with 480 tons per day of 8 hours; and yet it is stated that fifty waggons have to be dealt with at times, each carrying 10 tons. Further, that with one elevator out of gear, the other two can unload a large number of waggons without stopping the coal traffic. Let us first consider the unloading capacity of the elevators. From the drawings, I assume that six waggons are drawn alongside three coal-breakers, one truck being located on each line to one breaker; and, with the distance over the buffers measuring about 20 feet, this would bring the same point of each truck alongside the coal-breaker hoppers, which measure about 5 feet square at the mouth, and are 4 ft. 6 in. above the rail level to bring the top approximately level with the bottom of the truck. The description states: "The coal falls direct from the waggons into the funnel of the coal-breaker."* This funnel will certainly not hold more than from 25 to 30 cwt. of coal; so that it is evident that the coal has to be shovelled into it. Assuming the trucks are somewhat similar to those in use in Great Britain, the method of filling the funnel would be by dropping the door which forms about one-third of the side of the waggon. Immediately the small coal begins to rush out at a speed, and over a surface which is too much for the funnel's capacity—especially if the coal used runs automatically at 26° as we are assured—a large percentage of the truck's contents will drop direct into the subtruded hopper without going through the crusher; and this is very much against the good working of every part of the plant, particularly in the event of a large piece of coal, a pit prop, stone, waggon-coupling link, piece of iron, or some other undesirably big object getting into the hoppers. The need of keeping out such material is, the "JOURNAL" for Jan. 29, 1900 (p. 268) shows, quite understood by the designers.

With a truck-door 5 feet long, at least 3 tons will have to be shovelled from each end of the truck to the central door, which will take time and labour. In the issue for Jan. 1 (p. 24), we are led to believe that the coal is dropped from the waggons direct to the hoppers, which is at variance with the statement on p. 22 of the same issue, that the coal "passes first of all through the breakers [Plate 1. Fig. 3] . . . and the coal falls direct from the waggon into the funnel of the coal-breaker." These large hoppers under crushers are built with bottoms angled at about 30°; and I have no hesitation in saying that coal will not automatically run out of a hopper at that angle if the hopper is loaded.

The skip is badly designed, having a capacity of 800 litres (about 12⅔ cwt.) only; so that it has to make two journeys to lift sufficient coal to fill a truck which has a capacity of 1 ton 5 cwt. 2 qr. 15 lbs. Why is its capacity 30 tons per hour when the breaker can only deal with 20 tons? Also where is the advantage of having the Hunt truck with a capacity of 40 tons per hour. To lift 30 tons of 2200 lbs., the skip has to make at least 48 journeys per hour, or one in 1 min. 15 sec. over a distance of about 60 feet vertically, then inclined 15 feet, stopping for dumping, declined 15 feet, with 60 feet drop, truck closed in pit, wheeled into position under hopper spout, then filled and withdrawn for vertical lift. The truck to do 40 tons per hour will have to complete 30 double journeys per hour, or (say) one in two minutes; and as the coal-store end is about 550 feet from the loading-hopper, the truck must travel about one-fifth of a mile in two minutes. It must be remembered that the truck starts slowly, and increases its velocity right up to the time it hits the buffers.

We have here an interesting problem: Given the length and declivity of track, with the weight of truck, find the force of the blow on the buffers, the strain on the cable and the end pulleys, the speed of the raising counterweight, the weight of same to pull up the truck in (say) 10 feet, and regulate the weight so as to obviate shock—at the same time making it so that it gives time for the truck to be emptied, and yet get the weight of sufficient capacity to return the empty truck a distance of 538 feet on an acclivity of 3 per cent., with the movement of weight through a distance of not more than 10 feet; also find the variable, increasing speed and force which must be raised and exerted on an available propelling distance, also not more than 10 feet, the truck having to travel in a decreasing speed a length of 538 feet in about 45 seconds, and be brought to a stop at the top end near the loading hopper without the use of a brake. There must be no risk of the truck leaving the rails at any point. The same weight and force must be capable of doing similar duty over any distance from (say) 40 feet to 538 feet. The man who lifts the elevator skip from a point 16 feet below the ground level has also to empty and return it to its place—all on a platform 50 feet above the point where the elevator skip has to be filled! The truck must be carried on the roof principals, which are 24·6 feet pitch and 32·8 feet span, so that all the principals must be of a strength out of all proportion to ordinary duty, simply to handle 40 tons of coal per hour, and also specially built to withstand the severe shocks due to sudden stopping, and extraordinary speed of the travel of the truck. A further disadvantage is that the rail-level at the far end of the stores is 15 feet lower than at the near end; so that if the latter is on a level with the roof principals, a hanging structure—increasing on every principal up to 15 feet on the end one—must be provided. Can details of this be furnished?

Compare this system with the arrangement of coal-handling plant as made in England. As the author of the articles under discussion states, there is no completely automatic plant in any gas-works in this country where the coal is withdrawn from the stores, although, I think, the plant at the Jersey Gas-Works will compare favourably with the Zurich one. But plants on similar lines have been put up at electric generating stations, and steel and chemical works. In English practice, the 10-ton coal-waggons would be brought to the coal-hopper, and over a ram worked by hydraulic, steam, or mechanical power, which would engage the back axle of the waggon in a piston-rod with a V-shaped end, made to raise one end of the truck. The coal

* See "JOURNAL," Vol. LXXVII., p. 22; or p. 4 of reprint.

would be automatically dumped into the hopper, which would have a capacity of one waggon, and with sides sloped to 45°. In the bottom of this hopper would be fixed a regulator, which could be either of two designs. One in use by Mr. Terrace, of Middlesbrough, consists of a jigging hopper-bottom, flanged on the sides and one end to prevent spilling; the other end being open to allow the coal to be jerked over into a crusher fixed below. Or a 3 feet wide travelling belt could be similarly fixed, as at the the Lanarkshire Steel Company's gas-producer plant, and so designed as to automatically extract coal from the hopper in the desired regular quantities, and deliver it over the end into a sub-truded crusher. The coal from the crusher gravitates to a double chain bucket elevator, having 30-inch wide buckets, pitched 2 feet to give a capacity of (say) 60 tons per hour at 100 feet per minute. The elevator requires to be set at a slight angle from the vertical; and buckets and chains would be guided on the packed angles to prevent swaying and spilling, though with a close steel casing the dust would be kept in the elevator. Large and suitably situated sight or manhole doors would be provided of necessity; and, in addition, an automatic continuous lubricating device would be in operation. Delivery over the top of the sprocket wheels would be made to a suitable conveyor.

Great care would have to be exercised in deciding upon the proper form of conveyor to have an effective carrying capacity of 60 tons per hour, through a length of 1100 feet; and naturally a well-designed tilting bucket-conveyor would be adopted. In a shorter length, this conveyor would be made to elevate the coal; thus doing away with the separate bucket elevator mentioned above. This conveyor would have buckets about 18 inches wide, pivoted between two chains, and made with as little space between the buckets as possible. The chain would be long pitch, not exceeding 14 inches, carried by chilled cast-iron rollers, which go between the double links, and form part of the chain, and so arranged that rollers can be removed without uncoupling the chain. The coal deposited in the buckets from the elevator through an automatic feeder would travel in the conveyor any distance in the top of the store, to the place where it required to be tipped. The coal-store could be the same design as at Zurich; and the contents would be drawn off by the return line of conveyors. This would necessitate either a roller form of feeder at every outlet, or one travelling feeder; and this could be driven from the conveyor, and would supply the buckets without spilling or overloading. Delivery could be managed on to cross-conveyors feeding the secondary elevators, as at present designed.

The main thing considered by a gas engineer is first cost. Well, the whole conveying plant on the lines described—to feed the stores and take off the supply to the cross conveyors—could be installed at a cost not exceeding £2000. The whole contrivance could be easily driven by 18-horse power. Two men could manage the whole plant. Repairs would not be more than 3 per cent. on the capital outlay, while 5 per cent. would easily cover the depreciation. Two of the chief benefits to be derived from this arrangement would be speed and reliability. I venture to assert that no conveyor specialists in this country would for one moment admit a comparison in results of working the truck system in use at Zurich with the one advocated here; neither, I think, would the C. W. Hunt Company put up a plant designed by them for an entirely different class of work to do the duty required at Zurich. Hunt's or some other skip elevator is desirable on canal or river banks for unloading barges, as in such a situation an elevator conveyor combination is not conceivable for doing satisfactory work with a duty of 60 tons per hour of large coal.

Let us now proceed to examine the arrangement and details of the store and unloading devices, of which details are given in a supplementary article (Jan. 29, 1900, p. 265). It will be observed that the floors are in three parallel compartments, hoppered on two opposite sides to the bottom, with an angle of floor 25° to 30° (drawing fig. 41 gives it at 26°). The statement is made that, "at this angle, the coal slides automatically." But I object to this, as experience proves that the automatic sliding angle for coal is an unknown figure, although, in practice, hoppers are made with floors angled 45° to horizontal.

Compare the angle of the store-floors with the angle at which retorts are set to obtain an even thickness of charges—viz., 32°. To get the coal to run at 32°, it is necessary that it should enter the retort at a speed which is obtained by the vertical drop of the coal from the measuring chambers down the charging-shoot. If you get a shovelful of wet coal, and put it in the top end of the retort, it would not run down; so how is the coal going to *commence* moving from a stationary position down an angle of 6° less. It is evident, then, that the floors are too flat, as they should have been built at 45°, which is the slope given to the 10,000-ton overhead coal pockets at the new generating station for the Metropolitan Street Railway Company of New York.

The Zurich stores are built in twelve distinct hoppers, which hold 1250 metric tons each; but there is no provision made to prevent spontaneous combustion which would readily take place with the crushed coal in use, although, of course, the fire would be confined to one compartment of 1250 tons capacity. Should a fire occur, it is difficult to see how it could be extinguished, as the bunkers could not be flooded.

Reverting to the conveyors, or rather jigging shoots, the first question is, Why were these trumpery things installed in such a fine works? It is stated: "The Kreiss shuttle conveyor is one of the simplest means of transport—solid, easy to work, requiring very little power, and very little attention." The simplicity is certainly obvious, as it is obtained at the expense of efficiency. But the conveyor is undoubtedly the reverse of solid; being made up of a shoot from steel plates less than $\frac{1}{10}$-inch thick, in a very long length without any longitudinal stiffeners. When it is considered that the conveyor is mounted on continuous wooden sleepers set in concrete blocks, the question of conveyor cost must embrace the expense of the foundations, which total up considerably higher than would be the case in an ordinary steel travelling tray, or gravity bucket conveyor. Then as regards horse power, if this is so very small, why put in such heavy foundations? I am inclined to think that Herr Weiss has made a mistake in stating 6-horse power will convey 14·5 tons over a distance of 308 feet on three conveyors; the troughs vibrating very quickly to move the material 425 inches per minute. I should have to see these transporters to appreciate them. The best contrivance about the conveyors is the feeder jiggers, which are doubtless very effective, possessing so many means of varying the amount of the feed and the speed. They are designed similarly to the automatic feeder which, as I previously indicated, has been introduced by Mr. Corbet Woodall and Mr. Terrace at Middlesbrough.

In order, let us now dissect the elevator plant. The arrangement of the conveyors is such that each elevator can receive coal only from the conveyors extracting coal from one-half of stores; so that, should the first two benches be at work, and the other two shut down, coal could only be obtained to work these benches from the half of the coal-store adjoining the two benches. As before pointed out, the statement that all parts of the plant are in duplicate is inaccurate—in fact, there are only three elevators for four push-plate conveyors, to feed coal for four benches of eight beds each. With two benches going, there would only be perhaps one elevator to supply them; this being arranged by means of a flap in a breeches shoot at the top. The overhead hoppers hold twenty-four hours' supply, which equals 72 tons, or 144 tons for two benches. Thus with an elevator raising 14½ tons per hour, it would take ten hours to lift the charges of coal for twenty-four hours' supply; and this is not good for such a large plant. Besides it is at variance with the statement ("Journal," p. 83, Jan. 8, 1900) that "the carrying of coal required for twenty-four hours' working is done in four-and-a-half or five hours."

As to the design of the elevator, I can only deal superficially with this, as no details are given. Still fig. 6 shows an open casing, and inside the retort-house, which would not be accepted by any English gas manager nowadays, on account of the dust. When showing some German friends over large inclined-retort installations recently, I was informed by them that the elevators used on the Continent, which were mostly of German manufacture, could in no way compare with the appliances made in this country. A completely steel-cased elevator is almost unknown, and, when made, is always far too light; being constituted with plates less than ⅛ inch thick, insecurely stayed. The chains at Schleiren are in double strand, with buckets fixed between, without any renewable skidder bars, so the chains themselves slide on the angle-guides, which must take a lot of power, and cause a deal of wear, which is the more to be regretted as no removable spring-steel paths are fixed on the angle-guides. There are a number of these elevators at work on coal-washers in Wales; and the number and cost of replace parts supplied is enormous. The buckets in the Zurich plant (fig. 9) are pitched too far apart, are of clumsy design, with such a badly-devised top shoot that a large percentage of the coal raised must miss it, and come rattling down the back leg of the elevator. The top structure is very inefficient, and yet costly. The cross girders, too, run into the wall at one end, and are supported at the opposite end on brick pillars, built off the retort-bench. From these are erected girders, which converge to the elevator head, and are without any cross-stays, so that the vibration must be very noticeable. On the underside of the cross girders are angled girders, which extend downwards to the wall of the retort-house—in some cases running right into the windows! Again, it is objectionable to have the elevators running up inside the retort-house and through the charging-stage.

The elevator delivers to either or both of the two push-plate conveyors, which are shown in detail in fig. 7. The description says: "It is important to note that these work automatically." Naturally, *all* push-plate conveyors work automatically; but, of course, like eggs, there are push-plates and push-plates. The one shown "is made of a strong link-chain, carrying plates at various points." The style of chain illustrated is entirely unsuited to the purpose, being too wide for the width of troughs, so that, when passing under the shoot from the elevator the largest part of the trough is closed by the chain, and the coal falls on, and is carried by the latter. The form or scraper plate is wonderful; and it is incomprehensible why such a design was made. Fig. 7 shows a ⎽⌐⎽ section bent into a very unaccountable shape. The coal will lodge in each scraper, and be carried to the end, where it will drop when the scraper is going round the end wheel, and require clearing away every few hours. The best form of chain on a scraper conveyor is made of single and double links; the width over all being not more than 1¼ inches. To the solid links, which are ½ inch thick by 1½ inches deep (swelled at the ends to 1 inch for the pin), would be bolted the malleable pusher frame, of straight and simple form. To this frame would be bolted the 2 in. by ⅜ in. flat bar, which slides on the top and bottom guides, lined not with hard wood, but with spring steel—

the paths and skidders being thus easily renewed. Further, this frame would carry the push plate, which would thus also be renewable. The troughs would be self-contained, with all the bearings attached to stools riveted to them, and thus ensuring rigidity. I consider the end stools and bearings, also the chain-wheel and tightening arrangements, in the Zurich plant are badly designed; and the whole of the conveying arrangements has apparently not been supplied by a firm of specialists (see fig. 7).

(To be continued.)

TECHNICAL RECORD.

MR. PERCY GRIFFITH ON GAS SUPPLY.

Inaugural Address at the Society of Engineers.

At the United Service Institution last night, Mr. PERCY GRIFFITH, M.Inst.C.E., F.G.S., the President for the year of the Society of Engineers, opened the new session of the Society by delivering his Inaugural Address. It dealt mainly with questions relating to gas and water supply; but, owing to pressure on our space, we are only able to give to-day the portion referring to the former subject, leaving the remainder for next week.

Gas Supply.—It is neither necessary nor fitting that I should deal at any great length with this branch of engineering, because the presidential address delivered by my worthy predecessor, Mr. H. O'Connor, as well as the "Transactions" of the various Gas Engineers' Associations, afford information of the most exhaustive and up-to-date character upon nearly every department in which the gas engineer is interested. For this reason, I do not propose to say anything with regard to the details of manufacture, all of which have been discussed at great length, and improved of recent years to an extent undreamt of twenty years back.

Competition with Electric Light.—It is, however, necessary to remind you that this rapid development of manufacturing details is due almost entirely to the rivalry of the electric light, which, being at first considered in the light of a mortal enemy, is now recognized as the greatest friend the gas industry ever had. No one would, I am sure, attempt to urge that this important industry would have made such rapid strides during recent years except for the incentive provided by the necessity for competing with such a formidable rival as electric lighting proved at first to be. Fortunately for gas engineers and gas investors, this rivalry, although still severe and of a continually extending character, has received a serious check owing to the reductions effected in the cost of making and purifying gas, the increased application of gas for heating and power purposes, the enormous extension of gas business among small consumers created by the "slot-meter" and "free fittings" system, and the more recent development of incandescent gas lighting for both internal and external purposes. A great deal might be said upon all these points, but I will content myself with a brief reference to the last named, this being conspicuous at the present moment for the remarkable advances made within the last few months.

Incandescent Gas Lighting.—From the remarks of Mr. O'Connor upon this subject in his presidential address delivered exactly two years ago,* you will obtain a very clear idea of the enormous influence exerted upon gas illumination generally by the incandescent mantle and burner; also of the weak points of the system which were most conspicuous at that time. Since then, however, much has been done to remedy those defects and to develop the application of the system generally; so much so, that it is now almost the exception rather than the rule to see the ordinary old-fashioned burners in use for street lighting. The incandescent burner is also making rapid inroads into our houses and shops. In fact, there is a very fair prospect of the near future seeing the ordinary burner entirely displaced, and lighting carried out on the incandescent principle altogether. This prospect is of more than ordinary importance to gas engineers, because it opens up the possibility of a complete change being made in the nature of the gas sent out. I mean that, if illuminating power is to be subordinated to heating power, or even eliminated altogether, the very elaborate and expensive processes of purification and enrichment now in use will be rendered unnecessary, and the cost of production reduced to a standard hitherto unknown. This state of affairs has indeed been already foreshadowed by the provisions inserted in the South Metropolitan Gas Company's Act passed last session, wherein the price charged is to be varied, within certain limits, according to the actual illuminating power of the gas supplied; and I think no great effort of the imagination is required to foreshadow the time when 14 and 16 candle power gas, at prices varying from 6s. to 2s. 3d. per 1000 cubic feet, will be a thing of the past, and the cost of artificial lighting—and incidentally the cost of motive power—will be reduced to a mere fraction of what it is at present. The enormous extension in the use of gas for heating and motive power which would obviously follow a change such as I have indicated is, I think, a very welcome prospect, not only to the gas engineer. but to the general public. The reduction of the smoke nuisance, the impetus to trade which a cheapening of motive power would necessarily involve, and the more effective heating of our living rooms, are matters of importance to everyone, and should secure increased efforts on the part of engineers towards their realization.

This is hardly a suitable occasion for detailing the many improvements recently made in the incandescent burner and the mantle; but it is patent to all that considerable advances have been made since Mr. O'Connor delivered his address, not only in overcoming the difficulty of vibration to which he referred, but in improving and cheapening the various parts of the burner itself, and especially in rendering it independent of the chimney—a source of so much trouble with the older designs. Looking, however, to the immediate future, there is still ample scope for development in the production of a more permanent mantle, or incandescent medium, and the further cheapening of this and the burner—improvements which must, unfortunately, await the expiry of existing patent and manufacturing rights, but which may be confidently anticipated before very long. It is doubtful whether any much greater efficiency (or candle power per unit of gas consumed) can be looked for, as the present maximum of 40 candles per cubic foot per hour is of itself a sufficient advance on the 3-candle efficiency of the argand burner; and any attempt to increase this appears to involve serious and prohibitive disadvantages in the increased cost of the light and the shortened life of the mantle. Still, as I have already indicated, there seems to be a vast field for further development in the direction of supplying cheaper gas having a much smaller illuminating power than is required for the ordinary burner; and I suggest that it would be a most interesting and instructive experiment if some enterprising gas authority would secure the necessary powers and undertake the entire displacement of ordinary burners with incandescent, and the supply of "low-grade" gas throughout its system at proportionately reduced charges.

Supervision of Fittings.—Arising out of this suggestion, let me call attention to a point which I consider of vital importance to the whole question of incandescent lighting—viz., supervision of mantles and burners. Many gas authorities have undertaken this on a fairly comprehensive scale, with excellent results, notably the South Metropolitan Gas Company, of which I am a consumer myself. Speaking personally for a moment, I am greatly impressed with the advantages of having my incandescent burners looked after and myself relieved of any worry or inconvenience in connection with them; the charge of 4s. per annum per burner being money well spent on my part, and, I should imagine, a very profitable source of revenue to the Company. May I urge upon all gas authorities the desirability of at once undertaking and extending this system to the utmost, as it must be obvious that the more general it becomes the more profitable it will be, owing to the reduced cost of supervision per burner. The time is past when responsibility can be said to cease on the delivery of reasonably pure gas at a statutory pressure at the consumer's meter; and no gas manager can hope to maintain or extend the success of his undertaking unless he is prepared to assist the consumers in making the best use of the gas after delivery. It is therefore but a small step to make the supervision of burners a special department of the general management; and as this can generally be combined with the lighting, cleaning, and maintenance of street-lamps, the extra cost of labour cannot be considered a serious objection, neither need the charge on the consumer be in any sense a prohibitive one. The recent practice of hiring out stoves, fires, and general fittings, and the rapidly extending use of slot or prepayment meters, all of which are proved to be extremely profitable investments of capital, are steps in the direction I have indicated, and afford the groundwork for a further extension of the internal supervision which, in my opinion, is so desirable and in fact necessary.

High-Pressure Incandescent Lighting.—In connection with the subject of incandescent lighting, there is, however, one feature of which the novelty is proved by the fact that it was not even mentioned by Mr. O'Connor in his address delivered only two years ago; and the importance is obvious to everyone. I refer to the high-pressure system applied to street, yard, and shop lighting. At the annual meeting of the Incorporated Gas Institute held in this building last June, three very interesting and exhaustive papers on this subject were read and discussed; and I cannot do better than refer anyone anxious to study the matter to the "Transactions" of that Institute, in which the papers and discussion are recorded in full.* It must, however, suffice for my present purpose if I call your attention briefly to the chief points of progress attained and the splendid prospect which this system has opened up for the further improvement of external lighting by gas.

Sugg's Improvements.—Although many gas engineers have interested themselves in this matter, and have devoted considerable attention to the theoretical and experimental aspects of the question, there are three firms which, by their successful application of the system to actual practice, are entitled to be called pioneers in high-pressure incandescent gas lighting. The first of these is represented by our old friend and member, Mr. William Sugg, whose contribution to the transactions of the Incorporated Gas Institute last June affords a most interesting review of the history of this question from its first inception. It is unnecessary for me to occupy your time by repeating what can be found elsewhere; and I will not attempt to retail this historical matter here.

* See "JOURNAL," Vol. LXXV., p. 326.

* See "JOURNAL," Vol. LXXVII., pp. 1723, 1726, and 1729.

I may, however, briefly summarize the various points of Mr. Sugg's work, which have contributed so largely to the successful application of high-pressure gas lighting. The chief of these is the design of a motor, driven by water pressure, for raising the pressure of the gas from that existing in the service-main to whatever may be required. This is small enough to be enclosed in the base of the lamp-standard, if required; is perfectly automatic; and maintains a perfectly steady pressure at the burner. It is designed more particularly for street-lamps at crossings and refuges where high power is specially necessary. Another application is a motor operated by steam-pressure instead of water. This also is of very small dimensions, and is perfectly automatic; being more particularly suitable for factories and yards where steam power is available. A third motor is driven by belting from shafting, or by a gas-engine, and is also adapted to workshop lighting. Besides these purely mechanical devices for pressure raising, Mr. Sugg has devoted special attention to the design of burners suitable to different purposes, to the automatic regulation of the gas consumption, and to the most effective disposal of the light obtained at the burner. In this last particular, I think it must be admitted that Mr. Sugg stands pre-eminent, and almost, if not entirely, alone, in the services rendered to the gas industry.

Welsbach Company's Improvements.—The second firm to which I have referred is the Welsbach Incandescent Gas-Light Company, now, unfortunately, occupying a somewhat too prominent position in the financial world. In this case also I can only describe their work in the briefest possible terms. It cannot be denied that in their Kern burner a great advance was made in incandescent lighting, if only in the abolition of the chimney—the most objectionable feature of the whole system. Having solved the problem of mixing the air with the gas in the most efficient manner, it became a very simple matter to restore the chimney (in this case made of metal) in order to produce the necessary draught, and to slightly modify the burner to suit the special conditions of high-pressure lighting. It is, however, as (practically) the sole manufacturers of mantles that this firm has made the most conspicuous and needful advances. The extra pressures and the more rapid gas consumption in the burner involved the necessity for greatly strengthening the structure of the mantle, and great improvements have been made in this direction. There is, however, much yet to be done before a perfect mantle is produced suitable for this modern feature of gas lighting; and it is earnestly to be hoped that the near future will see a solution of this most difficult problem.

Scott-Snell Lamp.—The third firm in question is the Scott-Snell Self-Intensifying Gas-Lamp Company, who appear to have successfully overcome the necessity for any extraneous power being called into operation in order to secure the higher pressures required in this system. Their automatic pressure raiser or "self-intensifier" was very clearly described by the patentee, Mr. Scott-Snell, in the third of the Gas Institute papers I have referred to; but as the principle is entirely a novel one, I may be pardoned for briefly recapitulating the leading features of it. The object of the apparatus is mainly to utilize the waste heat of the burner to compress either gas or air for high-pressure lighting or other similar purpose. In the first instance, and at the time Mr. Snell's paper was read (June, 1901), there was no thought of compressing anything but the gas required for the burner or burners connected with the particular apparatus; but recent experiments have shown the much greater advantages of compressing air only, and introducing this into the burner at the required pressure, and this is what is now done. The evolution of the motor was not by any means a simple operation, as will be seen from the conditions which the inventor found to be essential—viz. (1) It must be operated by waste heat; (2) require no lubrication; (3) have no dead centre; (4) have no fly-wheel, connecting-rods, stuffing-boxes, or friction-creating parts; (5) be self-controlling; (6) inexpensive; and (7) simple in construction and repair.

The apparatus, being completely enclosed in the ordinary head of the lamp, is very inconspicuous, and there are no external fittings, except one small pipe conveying the compressed air to the burner, with a small box containing the whole of the necessary valves. The top is formed with a circular water reservoir or dish having a lid which keeps the supply of water replenished by rain, &c., and which also serves to condense any water evaporated within the reservoir before it is dissipated into the external air. In any but very hot climates, or exceptionally dry weather in this country, this arrangement obviates the necessity for periodical re-charging of the reservoir. The actual pumping of air is effected by a reciprocating displacer in the form of a relatively large hollow drum or cylinder with a very short stroke, the weight of which is supported by a spring acting on a vertical rod fixed in the top of the drum. This rod operates a flexible diaphragm (which forms the equivalent of the stuffing-box) at the extreme top of the apparatus—that is, above the water dish, but under the lid of the same. The working cylinder, which is open at the top, is slightly larger than the displacer, and is provided at the upper end with an air-inlet and the outlet for the air when compressed. The principle of working is somewhat complex, and can only be clearly understood from diagrams or an inspection of the various parts of the apparatus. The reciprocations average about 120 per minute, but are more or less rapid according to the number of burners (and therefore amount of heat applied) at the base of the cylinder. By this means, the amount of air delivered is automatically governed in proportion to the quantity required, although the valves secure the pressure being constant at whatever they may be adjusted for. This brief sketch will afford some idea of the remarkable results obtained by this new form of heat-engine under the very onerous conditions laid down, all of which will be found to have been successfully complied with. There can be no doubt that, with the improvements recently effected, this remarkable invention constitutes a great advance in the evolution of a perfect system of high-pressure gas lighting.

Inverted Incandescent Gas-Lamp.—No review of modern progress in incandescent gas lighting would be complete without a reference to a very important improvement by which the burner and mantle can be inverted or inclined at any angle. By this apparently simple alteration, gas lighting has made yet another step forward as a competitor with the electric light, by rendering it possible to apply it in a decorative manner hitherto peculiar to the electric glow-lamp. The heat of this gas-burner, although not yet reduced to the standard of its rival, is rendered far less objectionable through its being distributed round an annular opening at the base of the globe, instead of being concentrated at the apex of the mantle or top of a chimney. It also has the great advantage of being absolutely shadowless.

A CONTINUOUS PROCESS FOR MAKING A MIXED GAS OF UNIFORM COMPOSITION.

(*Concluded from p.* 208.)

In order to make a quantitative comparison of the heat utilized by this new process and by other processes, some at least of the economies which continuous working effects, as compared with periodic working, must be taken into account and credited to the new process. Among such economies are, for instance: (1) The saving of heating up a second time the coke which is used in the generator; and (2) the saving of loss of carbon in the coke by the combustion which goes on until it is completely quenched, by avoiding the discharge of the red-hot coke into the air. This loss is estimated at 5 per cent.

The saving in wages for moving the coke, and the loss of coke through the crumbling caused by handling, will not be taken into account. The saving in heating power must be realized in a greater make of water gas being secured, thus—

The saving due to red-hot coke being fed into the generator, with a plant dealing with 10·47 tons (10,640 kilogrammes) of coal per twenty-four hours, is: $2 \times 10{,}640 \times 0{\cdot}65 \times 1000^{\circ} \times 0{\cdot}2031 =$	2,809,280	calories.
And the saving due to the abolition of quenching is: $10{,}640 \times 0{\cdot}65 \times 0{\cdot}05 \times 7200 =$	2,489,760	,,
To this must be added the 5·3 per cent. of tar, which in this instance is not gasified, and has a calorific power of 8700 calories per kilogramme ($10{,}640 \times 5{\cdot}3 \times 8700) \div 100 =$	4,906,104	,,
In the mixed gas obtained, there are	60,755,080	,,
Hence the heating value recovered is	70,960,144	calories

The heating value of the coal introduced into the plant, assuming that it is good gas coal, having a calorific power of 7800 calories per kilogramme (3538 calories per pound) would be:

$$10{,}640 \times 7800 = 82{,}992{,}000 \text{ calories.}$$

Hence the efficiency of the process is—

$$(70{,}960{,}144 \times 100) \div 82{,}992{,}000 = 85{\cdot}5 \text{ per cent.,}$$

when the tar is not gasified.

In order to ascertain the efficiency, having regard also to the fuel used in producing steam, the increase in the make of water gas, due to the economies effected in respect of the hot coke and quenching as mentioned above, must be taken into account. Therefore there must be added to the water-gas output in calculating the work done by the apparatus:

$$(2{,}809{,}280 + 2{,}489{,}760) \div 70{\cdot}75 = \text{about } 74{,}900 \text{ cubic feet of water gas.}$$

There are therefore obtained in all (see *ante*, p. 208) 610,560 + 74,900 = 685,460 cubic feet of water gas.

Now, experience indicates that 1000 cubic feet of water gas require an expenditure of 62½ lbs. of steam. With coal yielding eight times its weight of steam, and having a calorific power of 3085 calories per pound, the boiler fuel used will have a heating value of say

$$685{\cdot}46 \times \frac{62{\cdot}5}{8} \times 3085 = \text{about } 16{,}490{,}000 \text{ calories.}$$

This amount of heat has to be introduced in the process; and the efficiency, taking into account the boiler fuel, becomes $(70{,}960{,}144 \times 100) \div (82{,}992{,}000 + 16{,}490{,}000) = 70{\cdot}1$ per cent.

If the new process is to be compared with other processes which gasify bituminous coal without yielding bye-products, then the tar formed in the new process from the coal must likewise be gasified. The tar produced from the 10,640 kilogrammes of coal amounts to $10{,}640 \times 0{\cdot}053 = 564$ kilogrammes, or 0·555 ton. According to Ellery*, a ton of good tar yields, on carbonization in a retort, 16,000 cubic feet of gas and half its weight of coke, as well as ammoniacal liquor. Therefore the tar, if sprayed into the apparatus, will yield $0{\cdot}555 \times 16{,}000 =$ about 8900 cubic feet

* See "JOURNAL," Vol. LXIV., p. 26.

of coal gas; and, on the basis of a yield of 91,500 cubic feet of water gas per ton of coke, also

$$\frac{0.555}{2} \times 91{,}500 = \text{about } 25{,}400 \text{ cubic feet of water gas.}$$

The 8900 cubic feet of coal gas and the 25,400 cubic feet of water gas thus obtainable from the tar, will increase the quantity of mixed gas from the 10,640 kilogrammes of coal by 35,300 cubic feet; and the heating value of the total quantity of mixed gas will be 69,122,500 calories, instead of the 60,755,000 calories given above for the case in which the tar is not gasified. The calorific power of the mixed gas will, however, be only 82 calories per cubic foot, as the gas from the tar will have exercised a slightly depreciating influence on the mixture. The net result of the application of the new process to the gasification of good gas coal will be that one ton of coal will yield 80,560 cubic feet of mixed gas of the calorific power of 82 calories per cubic foot. The efficiency when the tar is gasified is $(69{,}122{,}500 \times 100) \div 82{,}992{,}000 = 83{\cdot}25$ per cent.

The advantages of the direct combination of carbonization and generation, afforded by this process, are clearly shown on calculating the cost of manufacture of the mixed gas obtained. The valuable bye-products of coal-gas manufacture are produced in even greater quantity and of better quality, with the exception of the coke, which is, of course, converted into gas. The process yields a light, clear tar, because the gas, owing to the application of the principle of reverse currents, never comes into contact with more highly heated retort walls, and therefore escapes the splitting off of carbon, which is responsible for increasing the specific gravity of the tar and making its distillation a matter of greater difficulty. The usual method of distilling coal in gas manufacture recovers only about 14 per cent. of the nitrogen present, and from 60 to 80 per cent. remains in the coke. By the action of the superheated steam on the incandescent coke, in its conversion into water gas in the generators, 90 per cent. and upwards of the nitrogen in the coke is converted into volaiile nitrogen compounds, as many investigators have shown. In the present process, these nitrogen compounds are for the most part recovered as ammonia in the course of the purification of the gas. Assuming that the coal contains 1·25 per cent. of nitrogen, and that 14 per cent. of the nitrogen is recovered in the carbonization process, also that the coke contains 1 per cent. of nitrogen, of which 60 per cent. is recovered in the production of water gas, then the total nitrogen recovered will amount to 0·558 per cent. of the weight of coal gasified by the process.

Then assuming that the following prices for coal and bye-products apply, the cost of the gas will be as shown in the following calculation, in which the tar is assumed not to have been gasified:—

Prices per metric ton (= 0·9842 English ton): Gas coal, 18s.; boiler coal, 17s.; nitrogen, £50; tar, £2.

Yield of gas per metric ton of coal = 76,000 cubic feet.
,, tar ,, ,, ,, ,, = 0·053 metric ton.
,, nitrogen ,, ,, ,, = 0·00558 ,, ,,
Boiler coal used . . . . . = 0·22800 ,, ,,

Then the expenditure on coal is as follows:—

1 metric ton of gas coal	=	£0	18 0
0·228 ,, boiler coal at 17s. per ton . . .	=	0	3 10½
		£1	1 10½

And the receipts are:—

		s.	d.		
For 0·053 metric ton of tar at £2 per ton . .	=	2	1½		
,, 0·00558 ,, nitrogen at £50 per ton.	=	5	7		
				0	7 8½
Making the net cost	=			£0	14 2

Hence the cost of raw materials for making 76,000 cubic feet of the mixed gas is $\frac{170}{70} = 2{\cdot}24$d. Taking the calorific power of the gas at 82 calories per cubic foot, 1000 calories will be furnished by the gas at a cost for raw materials of 0·0273d. If the calorific power of the gas coal is 3538, and that of the boiler coal 3085 calories per pound, the cost of 1000 calories in the coal used in the production of the gas will be 0·0280d. Hence it will be seen that, owing to the possibility of securing a return from bye-products, this process gives 1000 calories (or other quantity of heat) available in the form of gas, at a cost of only 97·4 per cent. of the cost of the same quantity of heat obtainable in the form of coal.

Herr J. Körting, in the paper to which reference has already been made, calculated that the cost of 1000 calories in the form of coal gas, would, after making deduction for the receipts from the residuals, be 0·046d.* Now on comparing this figure with the 0·028d. found for the mixed gas made according to the new process, it will be seen that this process affords an economy of about 40 per cent. in the cost of 1000 calories, available in the form of gas. Gas-works may secure this economy by adopting direct working up to gas of their incandescent coke. Moreover, the volume of the mixed gas obtainable from a given weight of coal would have four times the heating value of the volume of coal gas usually obtained from that weight of coal. Hence the coal needed for gas making would be reduced to one-fourth, and the amount of bye-products formed would be reduced in the same proportion. Consequently, their value—especially in case of the tar—would be likely to increase.

* See "JOURNAL," Vol. LXXVII., pp. 1311, and 1378.

The mixed gas has naturally the smell of coal gas, and artificial odourizing can therefore be dispensed with. Owing to the fact that there is no splitting off of carbon through decomposition of hydrocarbons—because the gas from the moment of its evolution passes away to cooler parts of the apparatus—the illuminating power of the mixed gas is greater than corresponds to the proportion in which coal gas is mixed with the water gas. The process appears, therefore, well adapted to relieve any scarcity of coal, and to afford a gas which may be equally well applied for lighting, heating, and the generation of power.

The paper by Dr. Besemfelder, of which the foregoing is an abstract-translation, concludes at this point. But the specification of the German Patent No. 126,729, published a few days ago, gives further details of the apparatus for carrying out his new process. After referring to the main features of his plant, already given in the above description, the patentee proceeds to describe the gearing by which the valves for reversing the operations in the working of the water-gas generators are actuated, so that the reversals are automatically effected at the right times. Though this gearing is in reality of a simple character, it cannot be adequately described in a short space and without reference to detailed diagrams. With regard to the construction of the body of the apparatus, it is pointed out that the tower may be reduced to the smallest dimensions if the carbonizer takes the form of a horizontal or slightly inclined rotating cylinder, as in that case there is no metal conveyor within the carbonizer liable to injury from the high temperature of the water-gas as it issues from the generators. The rotating cylinder is similar to that of rotatory cement burners. Such a slightly inclined rotating cylinder is employed in Stokes's apparatus for re-burning spent gas lime, which is in use at the Beckton and Poplar Gas-Works.

THE "CANNON" GAS COOKERS AND STOVES.

It is not the fortune of every manufacturing concern, on opening up for themselves a new channel of production and business, to make such an unqualified success of it as have the Cannon Iron Foundries, Limited, in their gas heating and cooking stove department. It only seems a very few years ago that we first heard of their name in connection with this particular and important branch of the gas industry; but in it they have made for themselves a secure place, and, by the means by which they have done this, they intend to hold the position. The works of the Company are at Deepfields, near Bilston; and there they are well situated for economical production. Their stoves and fires are undoubtedly of the first quality, and they possess several distinctive features, which are the result of a close study of present-day requirements. To these features our attention was called a few days since when visiting the new show-rooms the Company have opened in London at 58, Holborn Viaduct.

There the gas-fires, cooking-stoves, and other appliances by which the firm have earned their success are to be seen in great variety. Fires, from choice to plain design, invite inspection. Looking round, one immediately singles out for examination what is called the "Victory" fire. There is no question about this stove possessing a very striking exterior. It is handsome, and stands out boldly among the many others. It has also a good deep bed of fuel, which is raised to very powerful incandescence—an important factor in the production of this intensity being a patent cellular brick, which is credited with being the contributor of quite one-third of the heating power. The back of the brick is open at the bottom, tubes pass up it, and the heat is baffled at the top before it can escape; so that the brick becomes superheated, and is able to co-operate to a very valuable extent in the production of heat. At present this intensifier is only fitted to the "Victory" fire; but it is quite possible that before long it will be adapted to the cheaper patterns of stoves. The "Victory" is also fitted with a double burner. Several fires are on view finished with the firm's new enamel, "Vitrolustre," whose great virtue, we are informed, is that it is unaffected by heat, unless, of course, it comes into actual contact with the incandescent fuel. The fires which had been treated with this new enamel, and which were alight on the Company's stand during the whole run of the Crystal Palace Exhibition, are recognized among the others; and an inspection of them does not reveal the slightest injury to the enamel on their canopies or bodies; and even on the fireguards where the enamel came into direct contact with the fuel, it has only been partially removed. "Vitrolustre" is made in different colours, and presents a very bright surface. The Company have a simple arrangement for removing the burners of their gas-fires for cleaning. The fuel is not touched at all; but all that has to be done is to lift the small fender shielding the burner from the slots in which it rests; and the burner can then be drawn out without making a single disconnection—the gas-feed pipe being screwed on to the back of the stove casting.

A series of ordinary gas cooking stoves and ranges makes an imposing show. They are of excellent appearance, and are all strongly built. Stopping to examine the various samples, it is found that, in every possible way, the Company have endeavoured to limit the cost of maintenance—by, for instance, making all the parts interchangeable, the burners easily removable for cleaning or renewal, and fitting the stoves with their "Porceliron"

oven linings and their crown plates—the latter, in some cases, being reversible. This "Porceliron" is a surface of true porcelain on cast iron; and it is a commendable feature of the firm's productions. Their faith in it is proved by the fact that they guarantee it to last ten years; and a cooker on view which has been in use six years shows that they are pretty safe in this matter of the guarantee of their speciality. The grilling arrangement on the top of the cookers is very effective. The grilling-plate is situated between two distinct burners, controlled by separate taps—the top burner being used for boiling purposes, and the bottom one for heating the griller. The plate is thickly studded underneath with projections, which, on the gas being lighted, become red hot, and aid in presenting an equally heated surface above.

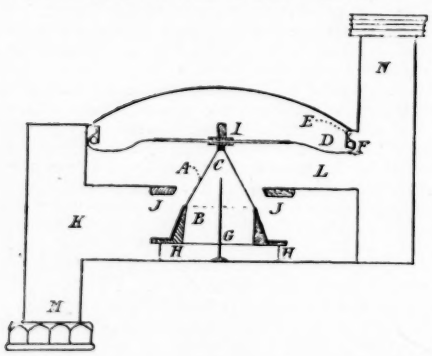
In cookers for slot-meter purposes, it is evident the Company do not intend to be beaten. They have produced quite a number of designs in different sizes and at different prices to suit requirements. We may take the "Bromley" as an example. This is a cooker that is double cased but not packed. The outside plates are of cast-iron; and it is fitted with enamelled steel oven linings. It is specially constructed for fixing in confined spaces—the top plate being not larger than the crown plate, and the taps are all fixed in front of the stove, but not protruding sufficiently to be dangerous. Of the "Bromley" stove, one Company alone have had as many as 1000, which proves their satisfaction. The "Villa" and "Sparta," and "Suburban" cookers are also very popular types. Of the last-named, one Company within a short distance of London have had more than 5000. No better testimony of the satisfaction it gives is required. In connection with the popularization of gas for kitchen purposes, a number of boiling-rings were shown to us stamped with the names of different Companies, who purchase them in large quantities for lending free to consumers. There is a considerable business done in this particular line. For grillers there is also a good demand, especially in the North, for slot-meter purposes. We cannot enter more fully into the many attractive fires and stoves to be seen at the Company's new show-room; but we may, in ending this notice, compliment them heartily on the solid progress they have made in this line of business.

REGISTER OF PATENTS.

Regulating the Flow of Gas through Pipes.—Cooney, H., and Tilling, W. A., of Tooley Street, S.E. No. 138; Jan. 2, 1901.

This invention relates to a double-cone valve consisting of a truncated hollow long cone upon which a short cone is attached gas-tight, reducing the height of the governor or regulator without interfering with the action of the hollow long cone.

The illustration shows a double body and a hollow equilibrium valve, carried by a flexible diaphragm of any suitable material—the valve being kept in perfect central action by a guide pin G running up into the hollow body of the valve, which rests, when fully open, on two supports H. A is a double cone-valve consisting of a truncated hollow long cone B of brass (2⅛ inches diameter at flange, 1⅛ inches diameter



at apex, and $\frac{9}{16}$ inch high), and kept in central position by the guide-pin G. A short cone of sheet metal C (1 inch in height) is attached gas-tight to the upper portion of the brass cone B, at its base, and secured at the apex by screws and nuts I to the diaphragm D. A flexible diaphragm D is attached to a top annular ring E, by means of a white-metal tube F; the tube being soldered gas-tight to an annular ring E. On this the flexible diaphragm D is attached, by means of any composition rendering the diaphragm free from friction and safe from leakage.

The gas, entering the inlet M, passes through the lower chamber K, and through the valve-seat J, into the upper or outlet chamber L, causing the diaphragm D to rise and bring the valve up to its seat—higher or lower according to the consumption of gas at the outlet N; thus maintaining an equal pressure there.

Treating and Purifying Acetylene.—Burgess, J. A., of Bradford, Ontaria, Canada. No. 241; Jan. 3, 1901.

This invention relates to a method for treating and purifying acetylene gas "in such a manner as to remove the matter which fouls and otherwise deleteriously affects the pipes and gas tips or burners."

The process consists in first subjecting the generated gas to the action of a condenser, then passing the gas so prepared over charcoal treated with a solution of metallic salt (say, sulphate of iron), then passing the gas through the calcium carbide, and then passing the gas through a chamber containing lava or refractory material (such as that of which burner-tips are made) previous to its entrance to the gasholder. Finally, the gas is subjected in the holder, before its entrance to the main, to the action of charcoal treated with a solution of metallic salt, then to the action of carbide, and then passed through a chamber containing lava. Passing the acetylene through the impregnated charcoal brings it into intimate contact with the metallic salt; while passing it through the lava is for the purpose of taking advantage of its affinity for the vesicles of the oily hydrocarbons.

Treating Carbide of Calcium.—Woodall, J. W., of Victoria Street, S.W., and Windham, F., of Hackney, N.E. No. 524; Jan. 8, 1901.

This invention relates to a process for treating calcium carbide in order to render it more suitable for use in acetylene-generators.

The patentees take pure calcium carbide ($Ca\ C_2$), or carbide which has been treated with petroleum or its equivalent, and impregnate it with naphthalene ($C_{10}\ H_8$) gently heated and raised to a temperature between its melting and boiling points. The carbide is also heated to the temperature of the liquid naphthalene, and is then immersed in the naphthalene for a sufficient time to ensure the absorption of the naphthalene into the carbide. A suitable protective coating for the carbide may be formed, it is said, by immersing the prepared carbide in melted paraffin wax, which slightly penetrates the mass, and "is found to intensify in some degree the illuminating power of the gas" given off from the carbide on bringing it into contact with water.

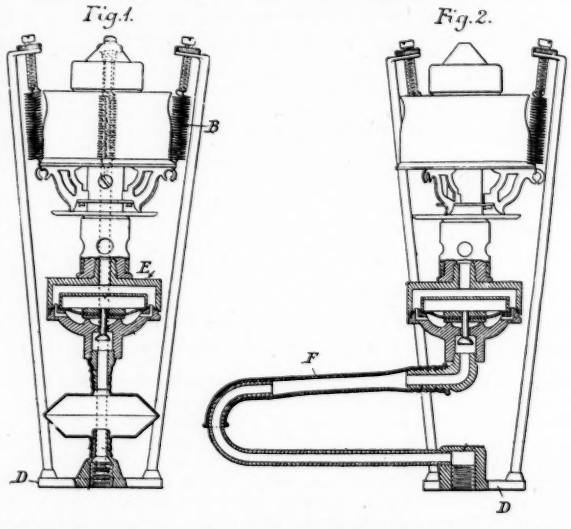
Carbide of calcium impregnated in this way with naphthalene, with or without treatment with petroleum, paraffin, or the like, is said to possess several advantages over the ordinary material. For instance, it retards the too vigorous action of the water on the carbide; and the latent heat given off by the action of the water on the carbide is utilized in volatilizing the naphthalene, which, in the form of gas, mixes with the acetylene and "improves the illuminating power of the gas." It has further been found that, as the gas which comes off from the carbide is not allowed to become hot, on account of the absorption of latent heat by the naphthalene, certain impurities which are generally given off by the carbide are prevented from being carried away by the illuminating gas.

Spring-Suspended Incandescent Gas-Burners.—Green, W., of Moseley, near Birmingham. No. 4350; March 1, 1901.

This invention relates to an anti-vibration burner and mantle-mounting, having self-contained means for steadying or preventing excessive movement of the burner when in its suspended position.

In fig. 1, the burner proper comprises a mixing-chamber, a body part telescoping on to the mixing-chamber, and having the usual wire gauze top, a central post for carrying the mantle, and a gallery for supporting the chimney. The burner is freely suspended from a series of spiral springs, whose upper ends are adjustably connected to the terminations of a number of rods rising from a base or foot-plate D attached to the gas supply-pipe, while their depending ends engage respectively with a number of hooks arranged (conveniently) around the gallery.

Fig. 1. *Fig. 2.*



A gas governor or regulator E (of any suitable type) is rigidly attached to the lower end of the mixing-chamber; and, in order to check excessive lateral and vertical movement in the burner, the casing of the regulator (which is connected to, and hung directly from, the burner) is made sufficiently heavy to constitute a counterpoise for the whole of the suspended parts.

The weighted governor-chamber is in communication with the gas supply-nozzle through a flexible connection, which will admit of the unimpeded movement of the spring-mounted fitting. Such connection, in the arrangement shown in fig. 1, consists of an elastic chamber F having flexibly or vertically-extensible sides, preferably of very thin rubber, and sleeves at the top and bottom to take over nipples provided upon the underside of the governor-chamber and the top of the base or bracket-plate D.

As an alternative arrangement (see fig. 2), the nipple on the bracket-plate may have a closed top, and a pipe extending horizontally from the side and connected to a cranked nipple or inlet of the governor-casing by a short length of flexible tubing F, also disposed horizontally, so as to provide for the unimpeded supply of gas in all positions of the burner, and at the same time afford a maximum of freedom of vertical

movement in the connection between the spring-suspended burner with the governor which constitutes its steadying weight.

Manipulating the Slide-Valves of Coal-Measuring Chambers in Connection with Inclined Gas-Retorts.—Herring, W. R., of Edinburgh. No. 17,586; Oct. 4, 1900.

This invention consists in "the application of hydraulic or other power to the working of the slides, instead of manipulating them by hand power through compound and other levers, involving as they do considerable physical labour and a greater expense in construction."

Fig. 1 is a sectional side elevation of a double setting of retorts, showing the base of the coal-storing hoppers and the manipulation of the top and bottom slide-valves of the coal-measuring chambers suspended beneath. Fig. 2 gives enlarged detail views of the valves for transmitting power to the double-acting hydraulic cylinders which are made to operate the slides in the manner shown; a pipe supplying the pressure at either end of each cylinder acting alternately as pressure and exhaust.

Mounted on girders are hydraulic cylinders B, the piston-rods of which are attached to the slides C, which run between guides immediately below the coal-hoppers D, from which the measuring-chambers E are suspended. The closing of the slide C simultaneously effects the opening of the lower slide F through the medium of the pivoted lever G, and *vice versâ*. The drawing shows the upper slide closed and the lower one open. The actuating valves are mounted on the stand H carried on the flooring; the pipes K being led under the flooring, or under the girder carrying the flooring (as shown), and up the sides of the buckstays.

In order to operate the slides C and F according as it is required to

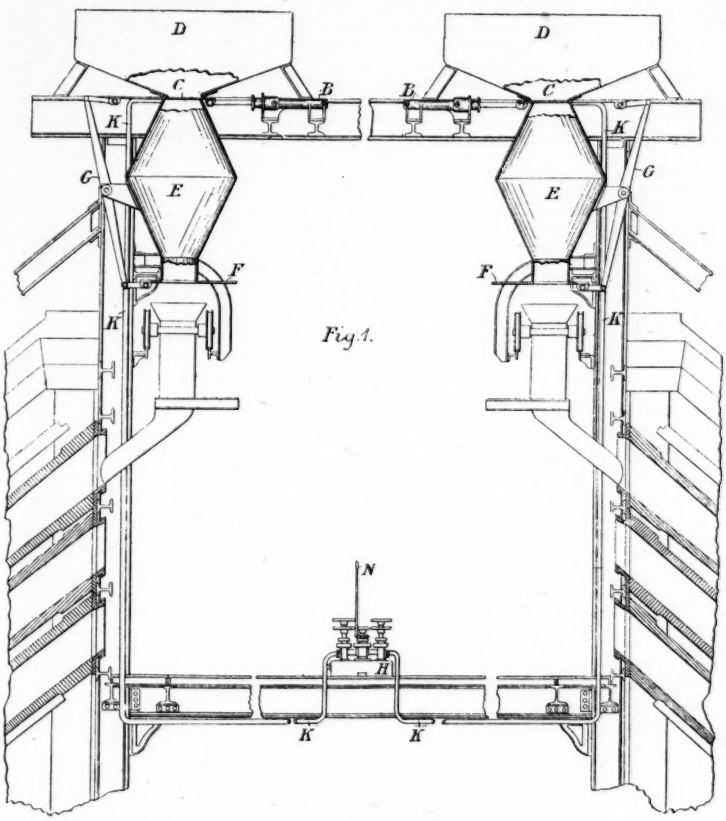
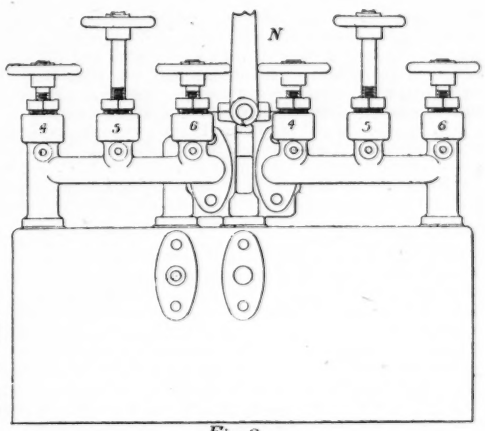


Fig. 1.



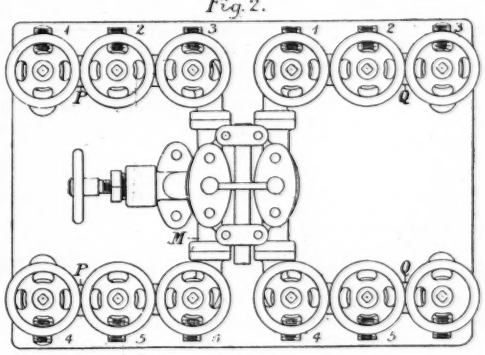


Fig. 2.

open or close the one or the other, the moving of the hand-lever N in the one direction causes the piston-rod to move out of the cylinder, so as to close the top slide—this movement simultaneously opening the lower slide F. On moving the lever in the opposite direction, the piston-rod is drawn into the cylinder so as to open the top slide, and simultaneously close the bottom one.

The elevation and plan of the hydraulic valve (fig. 2) shows an arrangement for actuating six cylinders. The numbers on the valves correspond with particular hydraulic cylinders. The valves 1 (fig. 2) are the pressure-valve and the exhaust-valve respectively of No. 1 cylinder; the valves 2 are the pressure-valve and the exhaust-valve respectively of No. 2 cylinder; the valves 3 are the pressure-valve and the exhaust-valve respectively of No. 3 cylinder; and so on, up to the valves 6.

In starting to work the appliance, the valve M of the pressure supply from the accumulator is opened. Dealing with (say) No. 1 cylinder, valves 1 are opened. The hand-lever N is now operated—the movement of which in the one direction actuates the piston of (say) No. 1 cylinder through the pressure-pipe of No. 1 pressure-valve, and through the exhaust-pipe of No. 1 exhaust-valve. The connection between the six screw-down pressure-valves and the main supply-valve which the lever N operates, is through the branch-pipes P; and the connection between the six screw-down exhaust-valves and the exhaust-valve of the lever N is through the branch-pipes Q. The arrangement is such that one of the compound valves can, by means of the supplementary ports or valves (1 to 6), be made to actuate any corresponding number of cylinders.

APPLICATIONS FOR LETTERS PATENT.

1466.—Brooks, B. W., "Utility gas-tube." Jan. 20.
1497.—Potter, W. G., "Gas and oil engines." Jan. 20.
1519.—Simmance, J. F., and Abady, J., "Heating apparatus." Jan. 20.
1568.—Lea, J. W., and Perrins, J. H., "Smoke-consumer carriers for incandescent gas-burners." Jan. 21.
1582.—Sagar, J., "Anti-vibrators for incandescent burners." Jan. 21.
1598.—Macdonald, R., and Rennie, W., "Acetylene-generators." Jan. 21.
1695.—Walrath, J., "Explosive engines." Jan. 21.
1713.—Pearson, H. W., "Measuring water under pressure." Jan. 22.
1719.—Southall, J., "Internal combustion engines." Jan. 22.
1742.—Watson, S. G., "Generators for the manufacture of acetylene and other gases." Jan. 22.
1763.—Short, S. H., "Internal combustion engines." Jan. 22.
1764.—Swaine, A. T., "Internal combustion engines." Jan. 22.
1774.—Schaëfer, W., "Incandescent gas lamps." Jan. 22.
1777.—Dymond, J., "Gas-producers." Jan. 22.
1817.—Smith, J. A., and Dick, M. & D. C., "Acetylene generators." Jan. 23.
1829.—Crossley, W. J., and Atkinson, J., "Treating the air and gas in gas-producer plants." Jan. 23.
1917.—Sloan, R. J. J., "Gas or oil actuated hammer." Jan. 24.
1931.—Beaumont, J. P., "Generators for acetylene." Jan. 24.
1990.—Dowson, J. E., "Production of generator gas." Jan. 24.
2001.—M'Nally, J., "Purifying acetylene or other gas." Jan. 25.
2030.—Marshall, H., "Carburetting air or gas." Jan. 25.
2056.—Sieverts, W. H. A., "Incandescent gas-burners." Jan. 25.

Gloucester Gas Supply.—At the meeting of the Gloucester City Council last Wednesday, Alderman Sessions called attention to the illuminating power of the gas, as reported from week to week during the month (15·53, 15·42, 15·36, 15·43, and 15·35 candle power), and asked whether the Chairman of the Streets Committee considered this satisfactory, since places of the same size as Gloucester, or thereabouts, were being supplied with gas of 19·25 and 20·33 candle power, and for the same price. Was there any inherent difficulty in supplying gas of this higher power; or why they should not, as in other places, get it at 15·5-candle power for 1s. 6d. per 1000 cubic feet, instead of 2s. 6d. as now? In these latter towns, profits arose from the manufacture of gas to the extent of from £2000 to £9000 per annum. He also wanted to know whether there was anything to prevent a reconsideration of the whole question, with a view to a new contract for a very much higher illuminating power at a very much lower price. The Mayor said they were indebted to Alderman Sessions for bringing up the question; but he suggested that the Chairman of the Streets Committee was, perhaps, in a somewhat awkward position, having regard to the prohibition of members with personal holdings in such companies taking part in any debate or division. The Gas Company now contracted to supply gas of 15½-candle power. On the suggestion of the Mayor, the question was referred to the Finance Committee.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

The Trend of Gas Invention.

SIR,—A poor reply, a very poor reply, that given by the "Writer of the Article" to my challenge. Totalled up, it amounts to a statement that it is in the matter of *quantity* only where you claim to be ahead. The question of *quality* is reduced to the solitary item of *lengths of retorts;* and this is put forward as an indication of progressive excellence. Oh! Mr. "Writer of the Article," how could you?

I retire from the contest (for the present) on the question of quantity, but quality!—let us talk of quality. Now, how shall I say graciously all the naughty things I wish to say? No; I won't say them, but will put down the pen and let my mind wander back to certain scenes.

I picture a certain Midland town, where the coals had "slipped" down the 20-footers—or were they 21-footers?—and the semi-coked mass of coal had jammed fast half-way down the retorts; and then I picture the huge delight of the onlookers at the arrival of the town fire-engine, called to pump water on, and around, the poor half-toasted stokers struggling with the jammed-up mass. As far as I know, we poor Continentals havn't called in the town fire-engine yet.

Again, I am carried in my mind's eye to a large and notable gas-works not many miles from London, and I see all the latest (British, if you please) improvements; the *piece de resistance* being the introduction of the coals into the retorts by a Brobdingnagian shovel or spoon to endeavour to induce the coals to lie evenly! Spoon or shovel, since relegated to a museum, I understand.

Now my immensely tickled mind wanders North of the Tweed, where I am given to understand the "*summum ultimum*" of all that the human intelligence is capable of evolving *re* inclined retorts, is to be seen and to be admired; and I am told that the delightfully simple process of "tickling" the coke out of inclined retorts is to be aided and abetted on the upper floor by a marvellously constructed glycerine-fed hydraulic-plunger-cum-shover-cum-ram poker concern; and that the young lady who works the double-barrelled shot-pouch lever arrangement (see the picture) will, in this particular instance, be assisted by a little toy in the form of a hydro-steam clockwork attachment.

Now I come to earth again, and review the photos and plans I have before me of various British installations; and I strive almost to the verge of lunacy to endeavour to discover where we are so far behind. Doing so, I lose myself in the contemplation of all the fearful and wonderful adjuncts which have been introduced (for the benefit of contractors, I presume) to unnecessarily complicate, disfigure, and render more costly an originally beautifully simple device, which, could he see them, would make the Jackdaw of Rheims give a great "caw!" and say, "Don't do so any more."

Contemplate for one instant the costly, riveted, built-up, buckstaves; look at the cumbrous, costly, light-and-air-absorbing continuous hoppers, with their forests of levers; and, goodness! What is this, the upper faces or walls of the settings crossed by tons of stays or struts jammed in between the unoffending buckstaves. Do please Mr. "Writer of the Article" kindly explain the use of these appendages; and why do you only put a 1½-brick division wall between your arches when we poor ignorant foreigners are not content with less than a 3-brick wall.

Yes! yes! we are much behind, and I begin to feel that I do occupy a "less elevated position," as dear Mr. "Writer of the Article" so nicely puts it. But it is sufficiently elevated to permit me to look down with tearful and pitying eye on the many engineering eccentricities applied to inclined retorts, on your side, which we poor "less elevated," backward, erring Continentals would never perpetrate.

Copenhagen, Jan. 30, 1902. F. D. MARSHALL.

P.S.—Mr. Marshall doesn't sit grimly on a 15-feet retort, but smilingly on a 16-footer.

[Mr. Marshall is an affectionate correspondent; and in controversy, as in many other ways, he is original and amusing. He speaks of my reply as "poor," and reiterates his estimate. To do this was easy and simple; but the writing of "p o o r" is not the production of controverting proof or argument. My "smiling" challenger calls me out, asks me to name my weapons of defence, and then, when this is done, he takes a flight to ethereal regions, and the rarefied air has a bad effect on him. Hush! he dreams. Visions of all that has been bad in the homeland in connection with the inclined retort system pass before him; but he sees nothing of what is good. He descends to earth again; and then our restless friend—he himself says so—goes and loses himself in the contemplation of all the fearful and wonderful adjuncts which have been introduced to "unnecessarily complicate" an "originally beautifully simple device." Such an utter want of control in a man is really terrible to behold. However, when Mr. Marshall has regained possession of himself, it will be a delightful thing if he will settle down, and send us a contribution on Continental inclined retort practice, and show us precisely what has been done, and is being done, by our friends abroad. He is evidently unprepared to do so just now, but contemplates doing something of the kind later on; for he says: "I retire from the contest (for the present) on the question of quantity." "*For the present.*" So be it; we will wait in pleasurable anticipation. Meantime, it is of interest to learn that Mr. Marshall has risen above his former opinions by 1 foot. Three years ago, he stated that "*no* arguments" would tempt him to exceed 15 feet for inclines. He has yielded to temptation to the extent of 1 foot; and if this rate of progress continues, his English brethren will, in ten or twelve years' time, have the supreme felicity of welcoming him with open arms as a convert to their faith.—THE WRITER OF THE ARTICLE.]

Profit-Sharing in Gas-Works.

SIR,—All those who look to a rational and just system of profit-sharing *plus* shareholding—briefly, co-operation—as offering the best hope of a solution of the very difficult problem, the relations between Capital and Labour, must have read with regret Mr. Burtonshaw's letter in the "JOURNAL" for the 14th ult. But not because it affords any ground for doubting the value of profit-sharing, instituted and carried out in the right spirit; only because it may be discouraging to those who, not having fully appreciated the possibilities of profit-sharing and the real basis of its success, may be hesitating to adopt it. Mr. Livesey has already pointed one moral to be drawn from Mr. Burtonshaw's letter—namely, that something more than the giving of a cash bonus is needed; but, for obvious reasons, he did not touch upon the question of the motives that prompted him to institute, and that led him unceasingly to urge the value of, profit-sharing in the gas-works with which he is connected.

Mr. Burtonshaw says that the idea of specially benefiting the workmen had little to do with the introduction of profit-sharing at his (Mr. Burtonshaw's) works. Now, everyone who knows Mr. Livesey knows also that he is, and always was, as anxious to benefit his men as to benefit the shareholders. And what I want to point out is this—that the comparative failure of profit-sharing in the one case was almost certainly due, in large measure, to the consciousness of the workmen (whose keen perception of motive is notorious) that the scheme was meant to benefit their masters rather than themselves, while the success of profit-sharing in the other case has been largely due to the fact that the men have always known that their employers were anxious to benefit them, and that they rejoice in their men's prosperity. Profit-sharing introduced for selfish ends alone can only be a partial success, even if it be not a failure; for motives will out. It appears to me very necessary that this truth should be understood, for it explains the failure of some of the schemes that have been started.

Ruskin, whose pronouncements on some other matters of political economy are as radically unsound as they are charmingly expressed, had a clear perception of the point I have been trying to make; and perhaps I may be given space for a quotation that is apt. Speaking of the view that the relations of master and servant consist rightly in the former getting all he can out of the latter for the least wage that the servant will take rather than go elsewhere, and that under such a system the whole obligations of the master are fulfilled, Ruskin, in "Unto This Last," wrote:—

> This is the politico-economical view of the case, according to the doctors of that science, who assert that by this procedure the greatest average of work will be obtained from the servant, and therefore the greatest benefit to the community, and, through the community by reversion, to the servant. That, however, is not so. It would be so if the servant were an engine of which the motive power was steam, magnetism, gravitation, or any other agent of calculable force. But he being, on the contrary, an engine whose motive power is a soul, the force of this very peculiar agent, as an unknown quantity, enters into all the political economist's equations, without his knowledge, and falsifies every one of the results. The largest quantity of work will not be done by this curious engine for pay, or under pressure, or by help of any kind of fuel which may be supplied by the chaldron. It will be done only when the motive force, that is to say, the will or spirit of the creature, is brought to its greatest strength by its own proper fuel—namely, by the affections.
>
> It may, indeed, happen, and does happen often, that if the master is a man of sense and energy, a large quantity of material work may be done under mechanical pressure, enforced by strong will and guided by wise method; also it may happen, and does happen often, that if the master is indolent and weak (however good-natured), a very small quantity of work, and that bad, may be produced by the servant's undirected strength and contemptuous gratitude. But the universal law of the matter is that, assuming any given quantity of energy and sense in master and servant, the greatest material result obtainable by them will be, not through antagonism to each other, but through affection for each other; and that if the master, instead of endeavouring [solely] to get as much work as possible from the servant, seeks rather to render his appointed and necessary work beneficial to him, and to forward his interests in all just and wholesome ways, the real amount of work ultimately done, or of good rendered, by the person so cared for will indeed be the greatest possible. Observe, I say, "of good rendered," for a servant's work is not necessarily or always the best thing he can give his master, but good of all kinds—whether in material service, in protective watchfulness of his master's interest and credit, or in joyful readiness to seize unexpected and irregular occasions of help. . . .
>
> In any case, and with any person, this unselfish treatment will produce the most effective return. Observe, I am here considering the affections wholly as a motive power . . . an anomalous force, rendering everyone of the ordinary political economist's calculations nugatory; while, even if he desired to introduce this new element into his estimates, he has no power of dealing with it, for the affections only become a true motive power when they ignore every other motive and condition of political economy. *Treat the servant kindly, with the idea of turning his gratitude to account, and you will get, as you deserve, no gratitude, nor any value for your kindness; but treat him kindly without any economical purpose, and all economical purposes will be answered. In this, as in all other matters, whosoever will save his life shall lose it; whoso loses it shall find it.*

That is a long quotation; I hope it may be forgiven for its value. The lesson is one that every employer must take to heart before the labour problem can be brought much nearer to solution. In these days of vast industrial undertakings it is increasingly difficult for the employer to win the "affections" of his men individually. But workmen are, as I have said, wonderfully quick to appreciate motive; and if employers will but take the necessary trouble to put their proposals intelligibly and candidly before the men, and will always keep before their minds, and strive to forward as far as possible, the interests and welfare of those men, the latter will very soon understand and respond to such consideration. But sitting in an office, drawing up a scheme of profit-sharing, pasting it up on the walls of the works, and then waiting for bigger profits, will do little or no good to man or master.

Feb. 1, 1902. F. G. NEWTON.

The Objections to Gas-Fires.

SIR,—Having been for some years a semi-invalid, the gas-fire in my bedroom, which has been there for twenty years, has become a more important matter than it was at first; and the results obtained will, no doubt, be amusing and interesting. One physician, with a great reputation, said: "On no account must gas-fires be used; they smell, and are very unhealthy." Any attempt to prove to him that the smell was caused by down-draught, and that a coal-fire would be equally

unhealthy, was simply fighting against the wind. There was no smell, and no down-draught, but the smell existed in his imagination. The judge's decision had gone forth, and he was infallible and unconvertible. Another authority informed me that if the stove did not smell, it made the air dry and unhealthy. I asked him to prove it, or give me his authority. This little argument led to the experiments on the dryness of the air with gas and other fires which have already been published. What is to be done when doctors, who expect faith from their patien's, will neither accept proofs nor have the faith they expect from other people? Another well-known physician objected to all gas-fires because they were noisy, and disturbed sensitive patients. I sent him a fire out of stock, without special testing, and, like a sensible body, he gave in at once. He had a governor on his gas-main. The fire was absolutely silent, and he had one in his consulting-room. Being a specialist in heart diseases, the faintest sound would have been quite out of the question, as some of the sounds in these diseases are almost inaudible to the most sensitive ears.

The use of steam-kettles in many lung affections is dying out, except in a few special cases; the normal 40 to 60 per cent. of moisture being considered satisfactory. But in the course of my experience and experiments, one very important point, which has never been noticed, is the fact that the percentage of moisture in the air can be varied in a most extraordinary way in different parts of the same room, at the same time, by the radiant heat from an open fire, whether gas or coal. The hygrometer in my room at the present moment shows 40 per cent. of moisture in the air, being sheltered from the direct radiated heat from the coal-fire. When this is placed so that the direct radiated heat reaches it, the apparent moisture drops at once to 10 per cent., although the moisture in the room must be absolutely the same—the distance between the places showing 40 and 10 per cent. being under 12 inches, in an open freely-ventilated room. It is clearly evident that if moist air is required, the patient must be screened completely from radiant heat; and this I have found to be the case in practice.

Another rule-of-thumb fad is that rooms should be kept at a temperature of 60° Fahr. If anyone will take the trouble to place thermometers at different heights—on the floor and 3, 4, 6, and 9 feet higher—the variations will be seen to be enormous, sometimes as much as 25° or 30°. Where is the thermometer to be? If the person is in bed, and about 3 feet from the floor, and the thermometer is placed as usual at about 4 ft. 6 in., the difference will often be from 5° to 7°, and sometimes more. If the thermometer shows 60°, and the patient is at a level where the temperature is 53°, no one knows it, and everybody is satisfied except the poor body in bed, who does not know what is the matter.

One can only pity the unfortunate gas manager, who has not only his own troubles night and day, but who also gets things of this sort thrown at his head. He is about the most abused man to be found at present.

Warrington, Jan. 31, 1902. THOS. FLETCHER.

Incandescent Mantle Making.

SIR,—It is evident that your correspondent, Mr. Marshall, has not had much experience in the making of incandescent mantles on a commercial scale, or he would never have ventured upon the statement that the prime cost of a mantle is about 1d. We have had considerable experience in this matter, and it teaches us that the actual cost of making 10,000 really good mantles is about 2¼d. each. Mr. Livesey's price of 3d. is, we consider, a very reasonable one; and we are sure you will agree that the profit in this case is not exorbitant.

If your correspondent had any idea of the difficulties we have had to encounter in turning out mantles in large quantities, he would certainly not suggest that gas companies should make their own.

BIRMINGHAM INCANDESCENT LIGHTING CO., LTD.

Jan. 30, 1902.

The Erection of Stands at the Crystal Palace Exhibition.—We have incurred the displeasure of Messrs. T. Lapthorne and Co., of Lambeth, in connection with statements we made, when noticing the recent gas exhibition at the Crystal Palace. In our first review of the exhibition, we reproached the Welsbach Company on the belated condition of their stand; and in the second notice, in view of the information given to us by one of the Company's representatives, which put the responsibility for the delay on other shoulders, we considered it only just to the Company that we should modify the reproach by publishing the explanation offered to us. "It must," we said, "be explained to our readers, as it was to us, that the lateness of completion was due to the contractors." But Messrs. Lapthorne and Co. have written denying this. "As a matter of fact," they say, "we had the stand made and fitted up at our workshops here; and, except for a little painting, papering, and fixing up, it was ready before it was sent to the Crystal Palace, and it would have been quite easy for us to have completed the Welsbach Company's stand in three days—two days under pressure." "The statement in your 'JOURNAL' is altogether wrong and misleading;" and it has led readers "to suppose there is incompetency on our part." In writing the sentences complained of, there was no intention of attributing to or even insinuating "incompetency" on the part of Messrs. Lapthorne and Co. In a second letter, the firm reiterate the statement that we were altogether wrong in blaming the contractors for the belated condition of the stand; and, referring to our remark that the experience of the Welsbach Company "is not likely to lead them to submit themselves again to even a mild rebuke for not being up to time," appears to our correspondents "to be altogether uncalled for, and not borne out by the satisfactory relation between the Company and ourselves." We are not called upon to decide which side has misinformed us; but if we have been misled, and an injustice has been done to Messrs. Lapthorne and Co., we sincerely regret it.

Crewe Railway Station was plunged in darkness throughout the night of last Monday week, by the collapse of the gas supply in consequence of the bursting of a main. Candles and lamps had to be used; and the mail traffic, which at midnight is very heavy, had to be conducted with the greatest caution.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress has been made with Bills:—

Bills presented and read the first time: Abertillery Urban District Council Bill, Birmingham Corporation Water Bill, Bradford Corporation Bill, Buxton Urban District Council Bill, Darley Dale Water Bill, Devonport Corporation Water Bill, Leicester Corporation Bill, Menai Bridge Urban District Council Bill, Nottingham Corporation Bill, Rhondda Urban District Council Bill, Street Urban District Council Water Bill, Swansea Corporation Water Bill, Ystradfellte Water Bill.

Bills presented, read the first time, and referred to the Examiners: Bristol Water Bill, Caterham and District Gas Bill, Consett Water Bill, Deal and Walmer Gas Bill, Devonport Water Bill, Longwood Gas Bill, Newcastle and Gateshead Water Bill, Rickmansworth Gas Bill, West Hampshire Water Bill, Wrexham Water Bill.

HOUSE OF COMMONS.

Thursday, Jan. 30.

LONDON WATER BILL.

Mr. LONG (the President of the Local Government Board) asked leave to introduce a Bill for "establishing a Water Board to manage the supply of water within London and certain adjoining districts." In doing so, he said: I approach a task of some considerable difficulty. It is one which has been essayed by others before me, and obviously without success, or it would not have fallen to the lot of the Government now to propose legislation on the subject. I am hopeful that we shall be able, successfully, to deal with this question, not merely because I am confident in the justice of the proposals we are about to make, but because I believe that, personally speaking, among all those concerned in this matter—whether it be the people of London as consumers, the ratepayers, or those who are interested in water companies—there is a general consensus of opinion that the time has come when this question ought to be finally settled, and a general and widespread desire that some reasonable scheme should be produced which will remove this subject of the administration of the London Water Supply from the field of political controversy. I do not propose to trouble the House with a historical retrospect of the London Water Question; but I am bound to say very briefly why it is that the Government find themselves called upon to propose legislation on the subject. The supply of water to a district, as a rule, is the duty of the municipal or local authority. The London County Council, established in the year 1888, were not made the Water Authority for the areas they governed; but inquiries were made into the subject, and, finally, on the recommendation of a Committee of the House, Parliament conferred upon them the necessary powers to apply for legislation which would enable them to become that authority. I do not want to raise any controversy between the London County Council and the Government. In the proposals I have to make, there is no feeling on our side of hostility towards the Council. At the same time, I feel bound to say that if they feel aggrieved because they have not by this time become the Water Authority for London, it is to themselves, and themselves alone, that they must look, and they must not throw the blame on Parliament. If they had made better use of the opportunities they had, I believe they would before now have been the Authority. They decided, however, to attempt to deal with this question in a way which certainly did not secure for them the confidence either of the community or of this House, nor did it enable them to pass the legislation which they brought forward. Last year, speaking on behalf of the Government, I said we could not go on session after session refusing proposals, and it would be necessary before very long for the Government to introduce legislation dealing with the water question. The Bill which I now ask leave to bring in is the redemption of the promise I made on that occasion. We have had the advantage of a very exhaustive inquiry by a Royal Commission, composed of extremely able men, who gave the subject most laborious, anxious, and careful attention. The report of the Commission is well worth close consideration by anyone who wants to know the history and facts of the case, while it is a very useful guide to those who propose to legislate upon it. The area which is represented by what is called Water London is a very large one. The area of the county of London is 117 square miles, the population is 4,536,000, and the rateable value £39,769,000. The outside area contains 449 square miles, it has a population of 1,362,000, and its rateable value is £7,303,000. This makes a total of 566 square miles, a population of 5,898,000, and a rateable value of £47,072,000. In the report of the Commission, it is clearly pointed out that, as the population of Water London grows, it will be in the outside areas that the great increase will take place, and that, in fact, there is in Inner London a tendency on the part of the population to spread out. Therefore, it cannot be wondered at that when the proposals of the London County Council to put the control of the water supply entirely in the hands of that body were made, they failed to secure the sympathy and support of those in the outside area. It is clear that any body which is to administer the water supply to Water London must be representative of the whole area concerned. It is suggested that that body should be the London County Council; but I submit that the Council represents Inner London, and does not, and cannot be held to, represent that large Outer London which is very vitally concerned in the proper and wise administration and settlement of this question. Those who take an interest in local government, and particularly in London, would do well to study the statistics dealing with elections in London for various local purposes. Regret is often expressed that so few persons take an interest in local elections. It is interesting to find that in the parliamentary elections in London of 1900 the percentage of electors who voted was 65, in the London Municipal Borough elections it was 45, and for the London County Council it fell to 40, while

for the School Board it was in four districts 17, 22, 17, and 14. This does not look as if it were very probable that if you were to create a new one, with a separate set of elections, your proposals would be more warmly welcomed by London, or that you would get any greater interest taken in them than in those already held. I believe it can only be by concentrating these local duties in one, two, or, at the most, three local bodies, and by limiting the number of elections, that you can give that real life to local government in London and elsewhere which we all desire to see. I will endeavour to explain the system which His Majesty's Government propose to substitute for the existing control of the London Water Supply. Clearly, some new authority must be found. There are certain principles upon which the Government feel that the creation of this new body should rest. In the first place, it must represent the whole area covered by Water London. It must rest originally on the principle of popular election. Clearly, as Inner London has much the larger voting population and rateable value, there must be a considerable majority representing Inner London; but there must be a fair representation given to the outside area, whose interests are also very great. The Government plan has been to take the sanitary authorities of all the area of Water London. In other parts of the country, it is the duty of the sanitary authority to provide the water supply. We take the sanitary authorities of Water London, and make it their duty to select representatives who will form a Water Board in future for London. The sanitary authorities we select are the Metropolitan Boroughs and the City, the urban sanitary districts of the outside areas, the London County Council, and the County Councils of the adjoining Metropolitan Counties.

Mr. LOUGH: Is it the area outside which is actually supplied, or the authorized area?

Mr. LONG: They are the areas which the eight Water Companies are authorized by their existing powers to supply. Now there are 28 Metropolitan Boroughs. Taking the basis of representation as nearly as we can, and the rateable value, we find there are six of them—Islington, Kensington, Lambeth, St. Pancras, Stepney, and Westminster—each of which will have two members on the governing body. The Common Council of the City will have two, and the Council of each of the other Metropolitan Boroughs will have one. The County Council of Essex will have one, the Borough of West Ham two, East Ham, Leyton, and Walthamstow one each, the County Council of Kent one, and Middlesex, Surrey, and Hertford one each. The Conservancies of the Thames and Lea will also have one each. Then there will be the urban districts of the outside area, who will also be represented. In this case, we have adopted the principle of grouping them together; each group to be represented by one member. This will give a total of 67, with a Chairman and Vice-Chairman, who can be elected from outside, and will be paid. The London County Council will have ten representatives out of the 67. The House will see from the figures that the Metropolitan Boroughs, the City, and the Council will have a majority of two-thirds on the new Board. The qualification for a member of the Board is that he must be a member of the council of the borough which appoints him; or, in the case of an urban district, a member of one of the district councils composing the group. The Water Board will be elected for three years. They will go out of office altogether at the end of three years, following the precedent of the Metropolitan Boroughs and the more recent precedents in all cases. But the first Water Board under this Bill will be appointed for four years—that is, a year extra; the object being to give them time to do the work they will have to do in getting possession of the undertakings and making a start, and then to allow them a reasonable time to commence the work of administration and supply. It will be the duty of each urban district to appoint a member of the Joint Committee, who will send a representative to the Water Board. There will be no election in the ordinary sense. A group of the Metropolitan urban districts is already in existence, and each of the urban districts will appoint a member of the Joint Committee, and the Committee will send a member to the governing body. The Chairman and the Vice Chairman will be elected by the Water Board themselves, and they can be elected from outside their own body. Power is given under the Bill to the Local Government Board to vary the constitution of the Water Board as time goes on, if, owing to alterations in population or other circumstances of the area concerned, it is necessary that the membership should be altered. This can be done by the Local Government Board by means of a Provisional Order. This, I think it will be seen, is a wise and necessary provision, because obviously a great part of this area may alter materially in the coming years, and it would seem to be very desirable that there should be power in the Government Department, protected by Provisional Order, to make such changes as may be necessary from time to time. Then it is made the duty of the Water Board to acquire the undertakings of the London Water Companies within the appointed time. They are to purchase by agreement, or, failing agreement, by arbitration; and to them, on the appointed day, will be transferred the powers, duties, obligations, liabilities, and works of the Companies. Where there are other duties apart from water supply, they will only be called upon to take over that part of the undertaking which concerns the supply. The new Board will have the power to promote legislation, and it is expressly stated in the Bill that they have power to appoint Committees to do the necessary work. The appointed day is fixed in the Bill as Jan. 1, 1903; but power is taken to enable the Local Government Board to extend the appointed day for a period not exceeding one year, if it is found necessary and expedient, in the interest of the authorities, that it should be done. The Bill provides that, assuming the settlement between the Companies and the Water Board is still continuing when the appointed day has arrived, dividends shall be paid to the shareholders until the purchase shall have been concluded. It makes provision for the costs of the Water Companies in the prosecution of their case—for instance, before the arbitrators—to be advanced to them by the Water Board; and it prescribes and gives to the Companies the right of access to their works, offices, and books, and anything else which they may require in the event of the negotiations between themselves and the Board not being entirely completed when the appointed day arrives. The purchase of the water undertakings being by agreement, or, failing agreement, by arbitration, the Government had to consider whether the arbitration should be left to take the ordinary form, as provided by law, or whether this is essentially a case in which the suggestion of the Royal Commission should be followed, and a special tribunal set up for the pu pose. We propose to establish a special Court of Arbitration, composed of three gentlemen; and I am happy to say that, whatever may be thought of some of our proposals, I am sure the House will agree as to the complete qualification of the gentlemen whose services we have thought it advisable to secure. They are the Right Hon. Sir Edward Fry, late Lord Justice of Appeal, Sir Hugh Owen, late Permanent Secretary of the Local Government Board, and Sir John Wolfe Barry, a very distinguished and well-known engineer. The arbitration clause gives full power to the arbitrators, and we have adopted the recommendation of the Royal Commission, and expressly state that in this case the usual practice of arbitrators allowing 10 per cent. for compulsory purchase ought not to be permitted, while the Companies are to be bought out upon a fair and just basis, and are to be given the fair value of their undertakings. Therefore the 10 per cent. charge is expressly prohibited. Further, there are words inserted in the clause providing that, in arriving at the price of the undertaking, it is not to be enhanced or depreciated by the consequences of the introduction of a Bill of this kind. It was felt that it would be unfair to the Companies, if the effect on their property was a bad one, to take this into account, and that, on the other hand, it would be unfair to the people of London to do so if the introduction of the Bill were to drive the property up, and so enhance the price. Further, the expenses of the Companies in regard to arbitration are provided for, subject, however, to the discretion of the arbitrators as to the reasonable and proper character of the expenditure. The decision of the Court of Arbitration will be final in regard to all matters of fact, while an appeal lies to the Court of Appeal direct in regard to questions of law. The arbitrators will have full power to hold such inquiries as they think necessary to fix the price; and they are given authority to fix an addition thereto in respect of any expenditure incurred in connection with the transfer, if they think fit so to do. The borrowing powers of the Companies are repealed, and the Water Board are given these powers in the way in which they are ordinarily conferred upon a local authority. They will be the Water Board for the area, and will represent, control, and administer the whole area now governed by the eight Companies. The Board will issue stock bearing a rate of interest of 3 per cent. per annum; and they are given power to rate, if the income of the area is not sufficient to meet the expenditure. They will issue their precept in the case of Inner London to the Metropolitan Boards, and in the case of the outside districts to the Overseers in the ordinary way. Perhaps it is right that I should say here that, in the case of outside areas, there may be some little difficulty in regard to the incidence of the rating, because at present they are not all supplied over the whole area by the Companies. The suggestion is that they should not pay upon their whole rateable value, but upon that of the portion supplied by the Companies, and that while this should be the basis upon which they will be charged, the sum would be levied over the whole area. The most important part of the Board's duties is the way in which they will pay the Companies for the properties they will take over. In the recommendations of the Royal Commission, it does not appear to be quite clear what they had in their minds. They suggested that, in the event of the Companies being bought out by a body appointed somewhat in this way, they might be paid in water stock or in cash; and they recommended that if they were paid in cash it would be necessary to make an allowance in respect of any loss the shareholders might incur owing to the loss of one investment and the period of time before the next investment would begin to bear interest. The Government, feeling that in this matter there was no precedent to which they could refer with any confidence as to what ought to be done, have had to consider what will be the general effect, not merely in London, but upon the commerce and trade of London, of the issue of a very large amount of water stock, in order that the Companies might be paid in cash. We had to consider whether it would not be desirable to adopt a suggestion, made from more than one quarter, to authorize the Board to pay the Companies by water stock bearing interest at the rate of 3 per cent. Believing, as we do, that we have given a tribunal, in the form of a Court of Arbitration, which is competent, and which must be satisfactory, and believing also that the Companies come with a good record and are offering good and sound properties, we do not consider that any hardship or injustice can be done, if we make it a duty to the Board to purchase the Companies at a fair price, to be decided by the Court of Arbitration, and if we make it their duty to pay for the undertakings in water stock—in other words, to substitute, for the existing stock of the Companies, water stock of London, which will certainly not be a worse security than anything they hold now. It will have behind it the property of the eight Companies, in addition to which it will have the rates of Water London. But while full justice should be done to the Companies and to all those who are interested in them, the utmost regard must, at the same time, be had to the ratepayers of London, who will have to pay for any losses that may be incurred or mistakes made. Therefore it seems reasonable to enact that the Companies shall be paid off in water stock secured on the properties of the eight Companies, *plus* the rates of Water London. With regard to the sinking fund, the Royal Commission recommended that there should be a longer period than usual given before the Water Board began to create a sinking fund. We adopt that suggestion, and in regard to all money borrowed, either for purchase or redemption of stock, we give the ordinary period of 60 years, but postpone the commencement of that period for 20 years—in other words, we give 80 years for the period of repayment. But where the sinking fund is required for any other purpose, the Bill gives the ordinary time of 60 years. With regard to the rural districts, we leave that part of London very much as it is now. The only difference we make is that they can require to be supplied in bulk, and that they will have to distribute the water themselves; and they will cease to be part of the district to be supplied by the Board. If they do not so desire, they will go on as they now do, and there will be no change. Special provision has been made with regard to places like Croydon and Cheshunt, and also Finchley and other towns, where they have a water supply of their own, but where it is not sufficient, and is augmented by the supply of

the existing Companies. There are also temporary provisions with regard to the servants of the Companies. We provide for the dissolution of the Companies after purchase has been completed, and for the distribution among the shareholders of moneys which they will receive for their properties. Whether the House likes the Bill or not, it is an honest attempt to deal with a very difficult question. We have not been animated by any feeling of hostility to the London County Council or any other local body. We have striven honestly to find a practical solution of this very difficult and long-vexed question. We are not anxious by the Bill to have a temporary triumph over the Council or any other body, but to find some plan by which this great question, so full of importance to the people of London, shall be permanently settled in a way which will not only do justice to all concerned, but which will provide the inhabitants of London in the future with that to which they are entitled—a plentiful supply of pure water on a satisfactory and just basis.

Sir H. CAMPBELL-BANNERMAN said the right honourable gentleman did not use the language of exaggeration when he spoke of the great complexity as well as the great importance of this question; and he had laid his proposals before the House with most admirable clearness. In one or two respects, it seemed to him that those who had hitherto taken an interest in this large question would recognize that important concessions had been made by the Government, as compared with the proposals put forward on previous occasions. With regard, for instance, to the valuations of the properties of the Companies, he recognized—although, without an examination of the actual terms, it would be difficult and dangerous to commit one's self to a positive opinion—that the general scope and idea of the proposals of the Government were a very distinct advance on what had previously been laid down. The right honourable gentleman had been fortunate to secure the services of the eminent men whom he had named to form the Committee of Arbitration; and if the terms of reference were suitable and safe, he believed that a satisfactory way of dealing with that most important side of the subject had been suggested. This was one of the most thorny points. Another was the constitution of the Board. There, he was afraid, he should part company with the right honourable gentleman. The constitution of the Board appeared to him to be a most extraordinary one. Supposing they were engaged in forming a Water Authority for some great municipal town, where should they go for the Water Board? Where was the mystery or the difficulty about it? They should go to the Municipality. London for many years had been destitute of any proper Municipal Government. The right honourable gentleman and his friends conferred upon it a Municipal Government; and though at first that body was exposed to strong animadversions, and a good deal of opposition had been shown to it, it had lived that down, and the right honourable gentleman himself had spoken in praise of the extraordinary ability and sense with which the London County Council conducted their business. The right honourable gentleman had stated that the Council had been meddling with this matter, and had always failed to gain the support of the London representatives in that House. But it had the hearty support of the London people in the Council.

Mr. LONG: I did not give that as the cause or reason for the Government's action. I merely stated as a fact that, whether the London County Council had been wise or ill-advised, they had failed to obtain the support of Parliament, and so we are compelled to act.

Sir H. CAMPBELL-BANNERMAN replied that the Council had obtained the support of the population of London. He regarded the new authority as something like the old Metropolitan Board of Works. The only object was to flout the County Council by gathering together a body from the bye-ways and hedges. Opposition to the scheme would be developed; and he hoped that opposition would be able to modify materially the portion of the Bill to which he had referred, unless some better reason for it was forthcoming than that just given.

Mr. BOULNOIS (Chairman of the West Middlesex Water Company) said he represented an interest which was exceedingly large and would require protection. Those who were connected with it would give most careful consideration to the Bill, into the discussion of which they would be prepared to enter at a future time.

Mr. BURNS said the right honourable gentleman had declared that the County Council was not appointed to deal with the water question. This was not their fault, but that of the step-mothers who brought it into existence and had been ashamed of it ever since. In his opinion, the Council was the best body to be entrusted with this work. It was a slight upon them that they were only to have ten members on the Water Board, which was large, unwieldy, and impracticable; and he predicted that within two years it would break down. When it did, the Council would be prepared, in spite of the slight now put upon them, to take the matter over.

Mr. HUDSON, speaking as one of the members for Hertfordshire, said he looked upon the Bill with grave apprehension. The people of his county would not only be adversely affected by the financial proposals of the measure, but they more than ever objected to the perpetuation of the power of the Water Companies to come to their district and take water which they needed for themselves. They could not afford to lose one drop of the water they now possessed.

Mr. LOUGH desired to associate himself with all the Leader of the Opposition and his honourable friend the member for Battersea (Mr. Burns) had said with regard to the selection of the Water Board. The outer areas of cities like Birmingham, Bradford, Manchester, and Liverpool were proportionately greater than that of London, and yet this fact had not been made the pretext for refusing to make these great Municipalities the water authorities. Nor should the outer area in the present instance have been made the pretext for refusing to make the County Council the Water Authority for London.

Mr. H. SAMUEL (Limehouse), as one representing a portion of the area which had suffered more severely than any other part of London owing to the insufficiency of water, gave a cordial support to the Bill, which he regarded as a sound and just attempt to deal with a vexed question. The President of the Local Government Board was to be congratulated upon having so efficiently redeemed the pledge he had given to the Metropolis last session. There was every evidence of the right honourable gentleman's desire to be thoroughly impartial as between the Water Companies and the ratepayers.

Mr. GRANT regarded the representation which was provided for in the Bill as based on vicious principles. So far as the outer areas were concerned, the representation would be worth nothing at all. With respect to the agreement which the new Board was entitled to conclude with the Companies, would that agreement, if come to, be subject to revision by the Court of Arbitration, or would it be binding? He inquired, because it appeared to him the Board might include in the price the 10 per cent. usually given for compulsory purchase.

Mr. LONG pointed out that if there were voluntary agreement there could be no compulsion. With regard to the practice of giving 10 per cent., he reminded the House that this was not provided for in the actual terms of the Lands Clauses Act. It was an excrescence which had grown out of the Act, largely by the action of arbitrators.

Mr. CORRIE GRANT said he should also like to know whether the Board would have any power of varying the charges for water. At present, these charges were levied on the rateable value of the houses. He also asked how it was proposed to deal with any profits which might be made. Were they to go in reduction of the water-rates, or in contributions to the rates of the local authorities?

Sir A. ROLLIT, without going into details, thought the Bill commended itself to favourable consideration; at any rate, it would give to London advantages which the Provinces had long enjoyed. If it should be necessary, as the County Council had proposed, to go to Wales for a supply of water, he hoped the new authority would do so. He repudiated the suggestion, in view of the remarkable growth of local feeling in the London boroughs, that the new authority would be another Metropolitan Board of Works composed of the representatives of vestries. Such a suggestion was not just to the Municipalities, which had attracted men of high character and standing.

Dr. MACNAMARA considered it a happy circumstance that they were now agreed that the Water Companies' undertakings must be handed over to a public authority. The controversy on this point had disappeared. He considered that the scheme submitted to the House was unwieldy, grotesque, and unworkable, and was likely to break down from the point of view of management; but, on the other hand, he thought the Government had been very reasonable in providing that the ratepayers of London should not pay 10 per cent. *solatium* to the Companies.

Mr. W. F. D. SMITH said they had reason to thank the right honourable gentleman for providing in a concrete form a scheme which removed their difficulties, and justified the course which they had taken during the past few years in opposing the schemes of the County Council. As to the question of representation, it was true the proposed Board was somewhat unwieldy in size, but he saw no reason to doubt that the outside representatives would be as efficient members of the Board as those of the County Council.

Mr. S. BUXTON, while opposing the Bill on the ground that it was not drawn on a broad and popular basis, said he considered it marked the fact that a great advance had been made, inasmuch as it was founded upon purchase, and the price did not include 10 per cent. for compulsory acquisition. He was quite sure every member of the House would have the fullest confidence in a Court of Arbitration constituted in the manner proposed; but he hoped the terms of reference would be full, and include not only the question of the present profits, but the unremunerative expenditure of £30,000,000 which the Water Companies would have to undertake in the near future. He contended that the constitution of the proposed authority was not representative of the ratepayers of London. It was a great mistake to make the proposed Board so unwieldy, as would be the case if it consisted of 67 or 69 members.

Mr. D. J. MORGAN, on behalf of the county of Essex, accepted the proposed representation as fair. He spoke for 200,000 people in the Walthamstow division, and welcomed the proposals of the Government as an attempt to right a grievous wrong.

Mr. CREMER, while admitting that there were many good points in the Bill, said he should oppose it on the ground that it was an attempt to revive the old Metropolitan Board of Works. He hoped the right honourable gentleman might yet see his way to making the County Council the Metropolitan Water Authority.

Mr. COHEN trusted that the strenuous opposition which the honourable member for Poplar (Mr. S. Buxton) had threatened to give the Bill would stimulate gentlemen on the Ministerial side of the House to rally to the support of his right honourable friend in his honest and sincere effort to solve a most urgent, and at the same time a most complicated, question. He (Mr. Cohen) had advocated that the water supply of London should be placed in the hands of a public authority. It had always seemed to him anomalous that it should be in the hands of Companies charging varying prices in different districts.

Mr. G. LAWSON, in reply, said he thought his right honourable friend might, on the whole, congratulate himself on the reception given to the Bill to which he had devoted so much attention. As regarded any profits that might arise, they would go towards the general working of the undertaking. The main point of attack on the Bill was that the representation on the Water Board was indirect, and that the London County Council had been slighted. He could not understand the morbid appetite for adding to the number of popular elections which was displayed on the opposite side. The electors at present chose the best men for all purposes to sit on their public bodies; and these would come together and select the men they considered most suitable for water-supply purposes. He did not think the Government ever expected to satisfy the extreme advocates of the claims of the County Council. He maintained that it would not have been right to pass over the new London Corporations, who were the local sanitary authorities. These bodies had no confidence in the water policy of the Council, and would do anything rather than fall under it. The proposals of the Council, in the view of these Corporations, and also according to the report of the Royal Commission, were recklessly extravagant.

Leave was given for the introduction of the Bill, which was then brought in and read the first time.

THE BREAKING UP OF THE LONDON STREETS.

Sir H. VINCENT asked the Secretary of State for the Home Department if he could hold out any hope of steps being taken to prevent the streets

in London from being broken up by gas, water, electric, and hydraulic power companies and various civic authorities without system, to the inconvenience of the public.

Mr. RITCHIE: I understand this matter is engaging the active attention of the local authorities within whose jurisdiction it properly falls in the first instance. The Corporation of the City have deposited a Private Bill in which they ask for powers to control the breaking up of the streets within their area. For the rest of London, I am informed that the County Council are in communication with the Borough Councils, and hope to be in a position shortly to put forward proposals for legislation giving them the necessary powers as the central authority in this matter. Any such proposals will receive the careful consideration of the Government; and, knowing as I do the gravity of the inconvenience caused by the present state of things, I shall be glad, if it lies in my power, to help the matter forward.

The following progress has been made with Bills:—

Bills read the first time, and ordered for second reading: Abercarn Urban District Gas Bill, Bedford Corporation Water Bill, Belfast Corporation Bill, Birkenhead Corporation Bill, City of London (Streets) Bill, Finedon Urban District Water Bill, Higham Ferrers and Rushden Water Board Bill, Knaresborough Improvement Bill, Liverpool Corporation Bill, Newport Corporation Bill, Omagh Urban District Gas Bill, Ticehurst Water Bill, Tipton Urban District Council Bill, Wadhurst Gas Bill.

Bills read the first time and referred to the Examiners: Barking Gas Bill, Bournemouth Gas and Water Bill, Broadstairs Gas Bill, Bromley Gas Bill, Chard Gas Bill, Commercial Gas Bill, East Worcestershire Water Bill, Fareham Gas Bill, Grand Junction Water Bill, Kent Water Bill, Leyland and Farington Gas Bill, Limpsfield and Oxted Water Bill, North Warwickshire Water Bill, South Metropolitan Gas Bill, West Gloucestershire Water Bill.

A Bill has been introduced to provide for improving and extending the procedure for obtaining parliamentary powers by way of Provisional Orders in matters relating to Wales, including Monmouthshire. It stands for second reading on the 16th of April.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Thursday, Jan. 30.

(*Before Mr. Justice* BUCKLEY.)

Acetylene Illuminating Company, Limited, v. United Alkali Company Limited.

This was an action for infringement of patents for the manufacture of calcium carbide for the purpose of making acetylene gas. As originally framed, it was based on four patents—viz., those of 1890 and 1892 granted to Thomas L. Willson, one of 1894 granted to Mr. Ellis, and one of the same year (No. 16,705) granted to Mr. Willson—but when it came on for trial, the plaintiffs confined their case to the last-mentioned patent alone.

Mr. MOULTON, K.C., M.P., Mr. ROGER WALLACE, K.C., and Mr. COLEFAX appeared for the plaintiffs; Mr. CRIPPS, K.C., Lord R. CECIL, K.C., Mr. WALTER, and Mr. BUCKNILL represented the defendants.

Mr. MOULTON, in opening the case, said the patent in question described the only method by which calcium carbide could be commercially manufactured; this being the necessary preliminary to the making of acetylene, which was a most valuable constituent in coal gas, and was employed for the purpose of enrichment, besides being used by itself as an illuminating agent. He believed the substantial question to be decided was that of novelty; and as the case was confined to the last patent, it would be much narrowed in its scope.

Mr. CRIPPS said he agreed with his learned friend that the main question would be that of novelty.

Mr. MOULTON then proceeded to read the specification, which described the method of producing calcium carbide by submitting a mixture of lime and carbon to the action of an electric arc, giving a temperature of approximately 3500° C., whereby the oxygen was dissociated from the calcium in the lime, and its place taken by carbon; thus producing calcium carbide, which on being dropped into water evolved acetylene gas to the amount of 5·28 cubic feet per pound of carbide. The construction of the electric furnace was described. It consisted of a carbon hearth connected with one pole of a battery, on which the mixture of lime and carbon was placed, around a carbon pencil coming down upon it perpendicularly, and connected with the other pole of the battery. On raising the pencil, an arc was struck, and an intense heat produced, resulting in the formation of the carbide. The first claim was for the manufacture of crystalline calcium carbide by subjecting lime and carbonaceous matter in suitable proportion to the continued action of electrically generated heat, substantially as described. The second was much the same, but it was limited to the particular form of furnace—viz., an electric arc between a carbon pencil above a conductive hearth and the materials thereon beneath. The third and fourth claims related to the production of the acetylene gas from the carbide.

Mr. CRIPPS here intimated that, having heard his friend's explanation of the patent, he thought the question of infringement might have to be considered.

Mr. MOULTON said he believed the substantial question would be that of novelty. The objections were numerous, but he did not propose to go into them at length until he had heard what was said about them. He must, however, deal shortly with one alleged anticipation, on account of a preliminary point which arose upon it. Shortly before the patent was applied for, a French gentleman named Moissan was conducting certain investigations into the behaviour of various earths under the influence of electric heat. It would be contended by the plaintiffs that M. Moissan's papers, which were published in the "Comptes Rendus," did not amount to any anticipation; that he did not show any means by which calcium carbide could be made commercially; and that, in fact, he was working on totally different lines. But, apart from this, he submitted that these papers were not admissible by reason of the International Convention and section 103 of the Patent Act. Mr. Willson, the patentee, took out a patent in the United States early in 1894, before the publication of the papers in question. His application for the present patent was in September, 1894; but prior to taking the grant—viz., in June, 1895—he applied to have the benefit of section 103, under which his patent would date back to that of the American patent. The Patent Office refused the application, and his patent was dated September, 1894. He (the learned Counsel) contended, however, that the Patent Office authorities could not by any rules of procedure which they might make, deprive the applicant of his rights under the section named.

Mr. CRIPPS said this point had been decided by Mr. Justice Romer, in the case of the British Tanning Company; and he suggested that his Lordship should rule upon it at once, as it might tend to shorten the evidence very materially.

After a discussion upon the point, his Lordship said he thought this would be a convenient course; and some time was occupied in arguing the question whether the plaintiffs could claim to have their patent ante-dated to February, 1894. In the result,

His LORDSHIP held that the defendants were entitled to rely on the anticipation in question.

Mr. MOULTON said he believed it would turn out that M. Moissan's was not an anticipation in fact. He would now proceed to call his evidence.

Professor *Dewar* said he had read the patent, and had considered the alleged anticipations. Calcium carbide was known before the date of the patent, as well as its power of giving off acetylene gas in contact with water, but not crystalline carbide. The inventions, to his mind, consisted in the employment of a suitable electric furnace. He had never come across a description of a commercial method of making carbide other than that of passing an electric current through it.

Cross-examined: Calcium carbide was known before as a chemical product of the laboratory, not as a commercial article. He believed crystalline carbide was first produced by this patent process.

Counsel then read from M. Moissan's papers, received in England March 16, 1894, the title of one of which was "The Preparation, by Means of the Electrical Furnace, of a Crystalline Calcium Carbide."

Witness said Moissan's object was quite different. He took precautions to prevent the materials coming in contact with the poles, and to avoid electrolytic action, depending entirely on the radiant heat of the arc. He did not send the current through the material. One could not understand this paper without reference to the previous communication in 1892. He did not deal with the question of heat in this paper; it was only one of a series. The Siemens furnace was a well-known type at that time; but in previous papers Moissan had warned his readers against using one—his object being to prevent the current from passing through the material. Witness then referred to the earlier paper in which Moissan described the furnace he used and the "thermal action of the arc." He said he took it that Moissan wanted to avoid electrolytic action. Witness was repeatedly asked to point out any language expressing this view; but he could not do so. He did not agree that when Moissan spoke of "the current passing through the furnace," it indicated that it would go through the material in the furnace. He admitted that anyone following Moissan's directions would obtain crystallized calcium carbide, but not in the same way as Willson, who employed electrolytic action, whereas Moissan, in December, 1893, in a paper describing the furnace he used, said the substances to be heated were not in contact with the electric arc. Heating by sending the current through the substance was well known.

Friday, Jan. 31.

Professor *Dewar's* cross-examination was continued to-day. He said that, in order to get the chemical reaction required, there must be a very high temperature. The oxygen in the lime had to be replaced by carbon, and this required an enormous expenditure of energy. In the great majority of cases, chemical reactions resulted in the evolution of heat; in this case, there was a large absorption of heat. He admitted that Moissan pointed out that, if the temperature were high enough, the calcium oxide would be reduced to metallic calcium; but the latter was in a state of vapour, and by that method the carbide could not be manufactured commercially. Moissan did not show how this could be done; whereas Willson did, for he directed the current to be passed through the materials operated upon. There were three well-known forms of electric furnace—the Siemens, Cowles, and the Atchieson; the first being an arc type, and the others incandescent furnaces. The distinction was pointed out in Willson's 1892 patent, and a mode described of passing the current through the material. One of the things pointed out by Willson was that calcium carbide in a melted state was a conductor. He stated, in the 1892 patent, that he had produced calcium carbide by passing the arc through the material. He could not agree that there was nothing further disclosed in the 1894 patent; but he failed, after many attempts, to point to any definite distinction between the two in this respect, except that in the latter he went further and described the packing of the material round both electrodes. With such an arrangement, the incandescent furnace and arc furnace merged into one another, according to the temperature attained. The details of the Cowles furnace were next gone into. Witness said this could be used as an arc furnace if the poles were slightly separated at the commencement, though it was known as an incandescent furnace. He did not know how defendants conducted their operation, and therefore could not say whether it differed in any way from Cowles's. The Siemens could be used as an incandescent furnace, if conducting materials were interposed between the poles. The second claim in the patent sued on was exactly the same as the first in the patent of Ellis, No. 16,342 of 1894 (one of the patents not now sued upon); but the first claim went further, and claimed any suitable form of furnace.

In re examination, witness said that he read Moissan's papers

as they were published, and they never suggested to him how to produce calcium carbide commercially. They were purely scientific researches on high temperatures; and he devised a form of furnace in which the arc, and the vapours existing in it, were kept out of direct contact with the materials operated on, so as to separate the thermal from the electrolytic action. This was shown by the description of the form of furnace he used. The calcium carbide he mentioned as the result of some of his experiments was not produced in the manner pointed out by Willson. Various extracts from Moissan's papers were referred to as bearing out these statements. Witness was then examined with regard to Willson's patent of 1892, the object of which he said was to prevent the formation of a pool of melted material in an electric furnace, which was fatal to the success of the operation, and injured the machinery. Cowles's furnace was then described. In its initial stages, there was no arc, or rather thousands of minute arcs; but ultimately, when the temperature rose until the materials were volatilized, it became an arc furnace. In plaintiffs' method, an arc was struck to start the action, then incandescence of the materials ensued, and ultimately there was a diffused arc until the whole mass was liquefied; and then the current would pass through it, unless it were drawn off.

Mr. *James Swinburne*, F.R.S., was next called. In his opinion, the specification simply explained the method of manufacturing calcium carbide—a method not disclosed in any of the anticipations. The specification indicated that the current passed through the materials to be operated upon. He agreed with Professor Dewar's description and explanation of the Cowles furnace. He had read Moissan's papers carefully. He passed the current over his materials, and not through them. He desired to avoid electrolytic action. The object of Willson's American patent of 1892 was to produce aluminium by melting alumina, and to avoid the evils arising from a liquid bath of fused alumina, which boiled up and splashed. The same difficulty did not arise in the manufacture of calcium carbide, to which the patent had no reference, though it was mentioned. He was thinking of partially reducing metallic oxides, and forming other compounds.

In cross-examination, witness said he should hardly think that the important part of the invention was the passage of the current through the material. The real invention was the manufacture of calcium carbide in an electric furnace; and he gave the means of doing so. Moissan had made specimens, but only specimens; and by his method could not have gone farther. Subject to the distinction between a scientific specimen and a manufactured product, Moissan anticipated Willson. If an electrical engineer had been asked to devise a method of producing quantities of calcium carbide, he would not have been assisted, but hindered, by following Moissan. The obvious thing would have been to take one of the well-known forms of electrical furnace, and experiment with it. The "toasting" method, as Moissan's had been called, was commercially impossible. In Willson's 1892 patent, the current passed through the material; and he stated that he had produced calcium carbide by that process. He thought the principal part of this invention lay in the idea of making calcium carbide commercially at all. Willson discovered two things: First, that he could make calcium carbide on a large scale; and, secondly, that it was useful, or, in other words, that it was worth doing. With regard to Moissan's furnace, in which the material operated on was placed in a carbon tube, if the tube were in contact with the arc, and the material inside were a conductor, some portion of the current would pass through that material.

In re-examination, witness said the furnace described in Willson's 1892 patent had special reference to aluminium. It could be used for producing calcium carbide if a proper mixture of lime and carbon were employed, but not otherwise. He did not consider the patent gave instructions as to how to make calcium carbide. He thought the mention of that substance was merely incidental; and if it suggested the manufacture of it, the directions given were wrong. To make carbide commercially, one must disregard both Moissan and the Willson 1892 patent.

Mr. *Dugald Clerk* was the next witness. He was first asked about the 1892 patent, which he said related to the production of aluminium, and the object was to prevent the spattering of the melted alumina. He thought the admixture of 15 per cent. of carbon would prevent this. Lime was quite different; it fused quietly. In making calcium carbide, decomposition took place at a lower temperature, and one got a molten bath, not of lime, but of calcium carbide. He found no directions in the specification for the production of calcium carbide. He agreed with the previous witnesses as to the object of Moissan's researches, and the method he had employed of applying the radiant heat of the arc and excluding electrolytic action. Earlier researches had been mainly in the direction of electrolytic action; and he wanted to study the action of heat alone, without the action of carbon vapour.

In cross-examination, witness said that lime was easier to deal with than alumina in an electric furnace, because there was no splashing of the molten mass. Electrolytic action did not interfere with the formation of calcium carbide. Willson pointed out the suitable form of furnace, and also the suitable proportions of materials to be used. A powerful current was to be passed through these materials. The furnace was partly incandescent and partly arc. He prescribed an arc furnace; but in its operation, it became an incandescent furnace. This would include a Cowles and an Atchieson furnace—it included everything but the Siemens and the Moissan "toaster."

In re-examination witness stated that Willson was quite wrong in his ideas with regard to the manufacture of aluminium as disclosed in his 1892 patent.

Mr. MOULTON said this concluded the plaintiffs' case.

Justice BUCKLEY said he had heard nothing yet about infringement.

Mr. MOULTON thought that was admitted.

His LORDSHIP, however, reminded him that Mr. Cripps had distinctly stated that there would be a question of infringement.

Mr. CRIPPS pointed out that some of the witnesses had distinctly said they knew nothing about defendants' method of manufacture.

Mr. MOULTON said he was rather taken by surprise. Professor Dewar had stated that he knew of no other mode of manufacture but that disclosed in plaintiffs' specification. The specification had been asked for and refused.

Mr. COLEFAX said he applied some time ago for an order of inspection, when his Lordship said he could not make it then; but if it appeared necessary later on, he might order it.

Mr. MOULTON submitted that evidence that there was no other process but that of the patentee was sufficient to shift the onus.

Mr. CRIPPS said he should like to see the authorities. It was a perfectly novel proposition. He should be very glad if his Lordship would decide the question of novelty.

His LORDSHIP said he could not do that if there was no infringement. He must ask Mr. Moulton for some evidence of infringement.

Mr. *Edward J. Duff*, Manager to the defendants, was therefore called. He said they mixed lime and carbon in certain proportions—1 of carbon to 3·2 of lime—into an electrical furnace. The electrodes were submerged in the material, which thus came in circuit. There was no arc; the heat was produced by the resistance in the circuit, which he had always considered was the Cowles method of electric smelting. The calcium carbide was not tapped off; it formed an ingot in the furnace. Between 1 and 2 cwt. of calcium carbide was produced by each charge. It was from a half to a third of the total charge; but an excess of material was used in order to protect the sides of the furnace. There was no arc at starting.

In cross-examination witness said he believed the proportions he had given were correct. The proportions mentioned by Willson were exactly those given by Moissan; and they were purely theoretical. The actual weights used by defendants were 60 lbs. of lime to 46 lbs. of coke. The electrodes were submerged in the material, and at starting a small piece of coke was placed between the poles. It was not an arc furnace. The distinction between an arc and incandescent furnace was well known. It was the Cowles process; but the furnace contained improvements of their own, which were patented.

In re-examination, witness stated that the piece of carbon between the poles did not disappear immediately, nor at all. The electrodes were 6¼ inches square.

Mr. MOULTON then addressed the Court on behalf of the plaintiffs, but very shortly; his speech consisting entirely of a citation from a judgment of Lord Westbury in the case of *Hill v. Evans*, in which he laid down, practically, that an anticipation must convey as much information to the public as the patent which it was said to anticipate

Mr. CRIPPS submitted that no case whatever had been made either of novelty or infringement, and that it would not be necessary for him to call evidence.

His LORDSHIP said Counsel must do as he thought right.

Mr. CRIPPS said as he had scientific gentlemen present, perhaps it would be safer, in view to future possibilities, to call them, which he would do next morning.

On the resumption of the proceedings on Saturday morning, Professor Ewing was called on behalf of the defendants; and he was under examination the whole day. The hearing was continued yesterday, when Mr. Cripps announced that it had been decided not to call any more evidence. Lord R. Cecil then addressed the Court, and Mr. Moulton replied. This occupied the time till the interval for luncheon. On resuming, his Lordship gave judgment in favour of the defendants on both issues—validity and infringement—with costs. A fuller report of this portion of the case will be given next week.

HIGH COURT OF JUSTICE.—CHANCERY DIVISION.

Tuesday, Jan. 28.

(*Before Mr. Justice* SWINFEN EADY.)

Husey v. The Gaslight and Coke Company.

Mr. MITCHELL moved *ex parte* in this case on behalf of the plaintiff, who is the Receiver appointed by the Court of the St. Ermin's Hotel, Westminster, for an injunction. The defendants had served a notice on the plaintiff that if he did not pay a sum of £400 odd due to them for gas, they would cut off the supply. He was instructed that the greater part of the cooking of the establishment was performed by gas; and irreparable damage would be done if the supply were cut off, while no harm would arise to the plaintiffs from supplying the gas for a few days, until the question was decided.

His LORDSHIP granted the injunction over Friday.

Friday, Jan. 31.

Mr. EVE, K.C., who appeared with Mr. Mitchell for the plaintiffs, said he and his learned friend Mr. Danckwerts, K.C., who appeared for the Company, had arranged the matter. The Company were prepared to give an undertaking not to cut off the gas for another week, on the plaintiff guaranteeing in turn to pay for any gas consumed, to include that used from the day he entered into possession—namely, Jan. 17. Upon these agreed terms, subject to his Lordship's approval, the motion would stand over for aweek.

Electricians' Liability for a Gas Explosion.

At the Uxbridge County Court, last Wednesday, before his Honour Sir Alfred Marten, K.C., William Froude, an ex-sergeant of police, sued the Uxbridge and District Electric Supply Company, Limited, and Callender's Cable and Construction Company, Limited, their Contractors, for damages sustained by him, as he alleged, through their negligence. On the 25th of November last, Messrs. Callender's workmen were engaged outside the plaintiff's premises, and in the course of their operations drove an iron wedge into the ground. A strong smell of gas was subsequently perceived, and the men were informed of it; but no notice was taken. Shortly after five oclock, when plaintiff's daughter lit the gas, an explosion occurred which blew out the front of the shop. It was contended that the escape of gas had been caused by the fracture of the pipe by a blow. It was argued, in defence, that the gas-pipes had been laid only 4 or 5 inches below the surface, a depth which a workman would never expect, and that there had been contributory negligence on the part of the plaintiff's daughter in lighting the gas. His Honour came to the conclusion that there had been

negligence on the part of the Contractors; and he gave judgment for the plaintiff, awarding him £20 damages and cost.

Tampering with a Gas-Meter.

At the Cardiff Police Court last Wednesday, a baker named R. J. Hollyman was summoned by the Gas Company for wilfully and fraudulently preventing a meter from duly registering the quantity of gas supplied to him, and also for wilfully extracting gas. Defendant pleaded guilty, and added that "it was done during his absence on his rounds, and he knew nothing at all about it." The Stipendiary: Then you should not have pleaded guilty. There could be no guilt without knowledge. Mr. W. A. Smith, the Company's Chief Inspector, said that he visited defendant's premises. He told the defendant he had come to examine the meter and no objection was offered. Witness found the meter, covered with a sack, above the door. He took hold of it to pull himself up, and the meter gave way; it being disconnected from the service-pipe. The supply apparatus was running through the bakehouse. There was nothing to record the quantity of gas consumed. In the bakehouse were four ordinary burners, and some 300 or 400 very small jets over a hot plate. The Stipendiary said that the case proved was one of great gravity. Had the defendant been summoned for stealing the gas, he might have been sent to prison for a very long time. As it was, he must impose the maximum fine of £5 for each case, and 40s. penalty in respect of the day of the offence.

MISCELLANEOUS NEWS.

GASLIGHT AND COKE COMPANY.

Half-Yearly Report and Accounts.

The following is the report on the working of the Company in the six months ended Dec. 31, which, with the accounts for this period, will be submitted to the proprietors on Friday:—

The accounts for the past half year show that, after providing for the fixed charges, there remains a balance, including the amount brought forward, available for distribution, of £398,988 5s. 11d., out of which the Directors recommend a dividend on the ordinary stock at the statutory rate of £4 8s. per cent. per annum, carrying forward the sum of £64,834 12s. 5d. to the credit of the current half year.

The Directors have pleasure in reporting that in August last they succeeded in placing the whole of the unissued ordinary stock (£163,190) at par, in accordance with the provisions of the Company's Acts of Parliament, and that subsequently they issued the balance of the Company's 3 per cent. debenture stock (£130,550) at a discount of 9·3 per cent. The net amount thus received on capital account—£281,556 10s. 2d.—has enabled the Directors to reduce by a corresponding amount their indebtedness to the bankers.

The proprietors have already been informed that the expenses of this issue of ordinary stock (which have amounted to £17,610, or 2s. 4d. per cent. per annum) can only be provided by means of deduction from the dividend on the ordinary stock of the Company. One such deduction, of 1s. per cent. was made from the dividend which was paid in September last, and realized the sum of £7530; and the Directors now ask the proprietors to agree to provide the amount of the balance of those expenses (£10,080) by a final deduction of 1s. 4d. per cent. from the dividend which will become payable on the 1st of March next.

The accounts for the past half year present no special feature. There has been an increase at the rate of 2½ per cent. in the quantity of gas sold, and there has been a reduction in the cost of coal of £178,986; but, there having been a corresponding reduction in the revenue from the sales of residuals, the net saving on the coal account for the half year has been £28,322 only. Owing to work of reconstruction which has been in hand, the charges for repairs and maintenance have again been considerably above the average of past years; but the special expenditure thus incurred is already yielding a return in the shape of a reduction in the amount of wages paid.

In furtherance of the policy indicated in the Directors' report of July last, it has been determined to dispose, by public auction, of the site of the Company's Pimlico station. The net proceeds of the sale of this property will, in accordance with the provisions of the Company's Acts, be available to defray the expenses of any new works.

In October last, the Directors re-opened negotiations with the South Metropolitan Gas Company for the sale of the Nine Elms works and the southern district of supply, in accordance with the second recommendation of Sir James Rankin's Committee of 1899. The price named by the Directors was arrived at after full consideration of all the circumstances of the case, and was, in their opinion, fair and reasonable. The Directors of the South Metropolitan Company declined to entertain the offer made to them, and abstained from making any counter-offer. The Court of this Company then renewed their proposal to submit the question to arbitration, and this was again rejected by the South Metropolitan Company. Under these circumstances, the Directors of this Company were unable to continue negotiations with any prospect of success.

An unusually large number of Bills containing proposals affecting the position of the Company, as users of the roads and streets in the Metropolis for the purpose of their mains and pipes, will be submitted to Parliament during the coming session. These will be closely watched with the object of securing full protection for the Company's interests.

The Court of Directors has been furnished by the several Engineers of the Manufacturing and Distribution Departments repectively with the usual certificates that all the Company's plant has been maintained in thorough efficiency.

The accounts accompanying the report consist of the usual statements, from which we extract the following particulars:—

The statement of capital (stock) on Dec. 31, 1901, sets forth that the total paid up is £9,466,500; added on conversion, £12,176,565—total amount authorized, £21,643,065. The statement of loan capital stood thus: Total paid up, £2,844,000; added on conversion, £1,479,975—total amount authorized, £4,323,975.

The capital account shows receipts (with premiums, £1,586,807) to the amount of £27,553,847 11s. 9d. The expenditure is shown in the following items:—

Expenditure to June 30, 1901			£13,011,791 3 7
Expenditure during the half year to Dec 31, 1901—viz.,			
Lands acquired, including law charges	£23 19 1		
Buildings and machinery in extension of works	5,892 11 0		
New and additional mains and service-pipes	7,603 14 3		
Do. do. meters	7,945 12 11		
Do. do. stoves	16,558 0 4		
		38,023 17 7	
Total expenditure			£13,049,815 1 2
Nominal amount added on conversion			13,656,540 0 0
Balance of capital account			847,492 10 7
			£27,553,847 11 9

The balance available for division is £398,988 5s. 11d.; and the statement showing how the Directors propose to appropriate it is as follows:—

Dec., 1900.			
£296,755	..	Net balance brought from last account	£97,993 12 10
254,998	..	Net revenue for the half year	300,994 13 1
£551,753			£398,988 5 11
(£4 8s. per cent.)		A dividend on the ordinary stock—	
£330,183	..	£4 8s. per cent. per annum on £15,243,200	334,153 13 6
£221,570	..	Balance carried to next account	£64,834 12 5

The three statements relating to the reserve, insurance, and depreciation funds show that the balances on Dec. 31 were as follows: Reserve fund, £54,103; insurance fund, £87,751; and depreciation fund, £59,248. The insurance fund had to bear in the past half year a sum of £96 4s. 8d., the value of plant destroyed by fires in the Company's district.

The following is the revenue account:—

Receipts.

Dec. Half Year, 1900.		£ s. d.	£ s. d.
	Sale of gas—		
£1,616,292	Common gas, per meter, at 3s. 5d. and 2s. 5d. per 1000 cubic feet	1,633,998 16 1	
	Public lighting and under contracts—		
88,103	Common gas	78,943 12 5	
£1,704,395			1,712,942 8 6
24,796	Rental of stoves	..	26,620 13 5
	Residual products—		
£404,503	Coke, less £43,407 12s. 4d. for labour, &c.	267,960 19 6	
14,363	Breeze, less £2328 15s. 8d. for ditto	10,922 18 10	
62,919	Tar and tar products	55,188 9 3	
69,823	Ammoniacal liquor and sulphate of ammonia	66,901 19 8	
£551,638			400,974 7 3
£4,799	Rents receivable		4,814 7 9
205	Transfer fees		248 6 0
£2,285,833			2,145,600 2 11

Expenditure.

Dec. Half Year, 1900.		£ s. d.	£ s. d.
	Manufacture—		
£1,006,313	Coals, including oil, dues, carriage, unloading, and trimming	827,326 13 2	
15,230	Salaries of engineers and other officers at works	14,578 13 8	
153,065	Wages, carbonizing £146,155 6s. 3d.	164,185 1 1	
17,483	,, sundries . £18,029 14s. 10d.		
38,556	Purification, including £18,515 19s. 9d. for labour	50,468 7 3	
218,149	Repair and maintenance of works and plant, materials and labour, less received for old materials, £6172 10s. 5d.	220,817 2 5	
			1,277,375 17
	Distribution—		
35,654	Salaries and wages of officers (including Rental Clerks)	33,423 1 8	
34,886	Repair and maintenance of mains and service-pipes	36,393 18 9	
23,992	Repair and renewals of meters	25,846 18 1	
30,945	Stove fixing, repairs, and renewals	32,094 9 3	
27,821	Gas fittings (automatic meter supplies)	4,723 0 7	
			132,481 8 4
17,286	Public lamps—Lighting and repairing	..	17,808 19 10
	Rents, rates, and taxes—		
6,133	Rents payable	6,222 15 9	
133,881	Rates and taxes	139,640 7 8	
			145,863 3 5
	Management—		
2,750	Directors' allowance	2,750 0 0	
225	Company's Auditors and Assistant	223 2 0	
11,089	Salaries of Secretary, Accountant, and Clerks	11,467 9 6	
21,070	Collectors' commission	21,656 3 3	
8,042	Stationery and printing	6,774 5 11	
3,900	General charges	3,361 15 11	
			46,232 16 7
	Parliamentary charges	..	1,117 6 3
727	Law charges	..	797 18 6
2,000	Charges *re* quinquennial re-valuations	..	..
5,064	Bad debts	..	5,809 14 1
500	Depreciation fund	..	500 0 0
15,016	Annuities	..	15,531 4 6
1,421	Workmen's compensation account	..	1,422 13 6
	Public officers—		
1,344	Gas Referees and Official Auditor	861 15 9	
1,640	Public testing-stations	640 11 8	
			1,502 7 5
£1,834,182			1,646,443 10 0
451,651	Balance carried to net revenue account		499,156 12 11
£2,285,833			2,145,600 2 11

The net revenue account stands as follows:—

Dec. Half Year, 1900.		£ s. d.	£ s. d.
£626,603	Balance from last account	429,751 2 3	
329,848	Less dividend on the ordinary stock for the half year to June 30, 1901	331,757 9 5	
			97,993 12 10
£296,755			
451,651	Revenue account	..	499,156 12 11
£748,406			£597,150 5 9

Dec. Half Year, 1900.		£ s. d.	£ s. d.
£66,505	Interest on debenture stock and bonds, accrued to Dec. 31, 1901	..	68,593 13 9
75,999	Dividend on the preference stocks	75,997 19 0	
45,500	Dividend on the 3½ per cent. maximum stock	45,500 0 0	
			121,497 19 0
8,649	Interest on temporary loans and sundry funds	..	8,070 7 1
551,753	Balance applicable to dividend on the ordinary stock	..	398,988 5 11
£748,406			£597,150 5 9

The statements furnishing particulars as to working are as follows:—

Statement of Coal Used, &c.

Description of Coal.	In Store June 30, 1901.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store Dec. 31, 1901.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	191,943	936,132	896,866	3,286	227,923
Cannel	14,206	8,088	*5,934	..	16,360
Total	206,149	944,220	902,800	3,286	244,283

* In addition to this quantity of cannel, 6,314,497 gallons of oil and spirit were used during the half year.

Statement of Residual Products.

Description.	In Store June 30, 1901.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1901.
Coke—tons	71,587	562,458	130,340	455,063	48,642
Breeze—tons	10,149	63,807	15,860	55,311	2,785
Tar—gallons	796,938	8,920,850	8,750,848	20,522	946,418
Ammoniacal liquor—butts	14,431	258,965	251,707	20	21,669

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights and Under Contracts. (Estimated.)	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
* 11,031,323	522,956	9,840,316	10,511,472	49,806
† 10,603,384	536,816	9,568,645	10,257,459	51,788

* Including 1,935,473,000 cubic feet of "oil gas." † December half year, 1900.

The last statement is the general balance-sheet. It shows that the value of the stores on hand on Dec. 31 last was as follows: Coals, £179,566; oil and petroleum spirit, £58,259; coke, £25,320; tar and ammoniacal liquor and products, £101,623; sundries, £255,439—total, £620,205. The figures for the corresponding period of 1900 were: Coals, £314,609; oil and spirit, £129,335; coke, £50,742; tar, &c., £135,127; sundries, £258,160—total, £887,973. The item "automatic meter supplies (balance of fittings account)" amounts to £165,948, as compared with £224,657 at the close of the six months ending Dec. 31, 1900.

Fatal Gas Poisoning Case at Coatbridge.—A domestic servant at Coatbridge, after remaining unconscious for nearly three days, died last week from the effects of gas poisoning. It is supposed that she lit the stove in her bedroom for the purpose of making a cup of tea, and that afterwards she failed to turn the gas off properly. The girl was found insensible; the room being full of gas, and the tap only half closed.

Barnoldswick Gas and Water Supply.—We learn from the Year Book prepared for the use of the members of the Barnoldswick Urban District Council by their Clerk (Mr. C. Thornton), that the net revenue from the sale of gas amounted in the past financial year to £3534, and that the total revenue was £4482. The expenditure on coal, wages, and management was £3253, which was brought up to £4212 by the interest and sinking-fund payments and the instalment of loans repaid; leaving a net surplus of £270 for the year. Of the 20,834,900 cubic feet of gas sold, 13,586,000 cubic feet were for lighting, 4,729,600 cubic feet for cooking, &c., and 2,519,300 feet for all purposes (through prepayment meters). The charge is 3s. 6d. for lighting and 3s. for cooking, less 3d. per 1000 cubic feet discount in each case; and 8d. extra is charged for automatic supplies. No advance was made with the increased prices of coal. The net water-rentals amounted to £1466, and sundry sales brought this up to £1468. The general expenses came to £638; interest on loans to £296; and the instalments of loans repaid to £385—making £1319, and leaving a balance of £149.

SOUTH METROPOLITAN GAS COMPANY.

Half-Yearly Report and Accounts.

The following is the report of the Directors of the above-named Company for the six months ending Dec. 31, which, with the accounts for this period, will be presented at the half-yearly general meeting on the 12th inst.:—

The last report made two important announcements—viz., the reduction of the standard illuminating power of the gas from 16 to 14 candles; and, concurrently, a reduction in the price of gas from 2s. 8d. to 2s. 3d. per 1000 cubic feet from Midsummer last. Of this reduction of 5d., 2d. is due to the two candles lower standard illuminating power; but, so far, the light given by the gas has only been reduced one candle. It was stated in the June report that "it will take time to work down to the new standard; but the consumers may be informed that it will make no appreciable difference to them in the matter of light." This is now proved by the fact that the complaints of bad lights in the half year have been considerably less than usual, and by the further fact that the percentage of increase of consumption of 6·76 per cent., is, as is generally the case, almost exactly the same as that of the adjoining Crystal Palace District Gas Company, the quality of whose gas has not been changed. The Directors emphasize this point because the opponents of the Company's Bill for the reduction of the illuminating power contended that to reduce the quality one candle, or about 6 per cent., would necessitate the use of some 15 per cent. more gas to get the same amount of light It is now proved by the actual consumption of the lower quality of gas during the half year that the opponents were mistaken. The consumers are, therefore, large gainers. There is no appreciable diminution of light from the gas, and they get it 2d. per 1000 cubic feet cheaper—an annual saving to them of about £90,000 a year. The immediate economy has been the abolition of the useless enrichment, which up to June last cost about £20,000 a year.

The reduction in the price of coal has been accompanied by a greater relative fall in the receipts for coke; and there is also a diminution in the value of other products. This was foreshadowed in the June report; but the lowering of the price of gas was a necessity, and the Directors are therefore glad to announce that the dividend of 5 per cent. can be maintained without having recourse to the reserve fund, the surplus of the June half year being more than sufficient to meet the deficiency on the last half-year's working.

The slot-meter business still grows, with no sign of slackening—7130 tenements having been fitted in the half year; the total number of such consumers being now 123,129, of whom 99,726 have cooking-stoves. Ninety collectors, selected from the Company's workmen (all being shareholders), are engaged in collecting the pennies from these meters.

The usual good word must be said of the employees of all ranks. In these difficult times for gas companies, it is a great satisfaction to the Directors to feel that they can rely upon the loyal co-operation of their officers and workmen.

The balance to the credit of the net revenue account, after paying interest on debenture stock, &c., is £149,291 11s. 8d. This permits the payment of a dividend at the rate of 5 per cent. per annum, and will leave £3041 11s. 8d. to carry forward to the next account.

Two Directors (Captain Thomas Bridges Heathorn and Mr. Simpson Rostron) and one Auditor (Mr. George Maughan Footner) go out of office by rotation. They are all eligible for re-election, and offer themselves accordingly.

The Bill promoted by the Company in the present session of Parliament, which will be submitted for the consideration of the shareholders at the Wharncliffe meeting to be held at the close of the ordinary general meeting, has for its objects the following three main points: (*a*) To acquire additional land at East Greenwich. In 1881 power was obtained to purchase about 100 acres, on which the Company's new works have been erected. The increase of business, however, is so great, that in from 15 to 20 years the whole of that land will probably be occupied. There remains about 80 acres of open land adjoining, which the Directors think it desirable to obtain power to secure before it is otherwise appropriated. (*b*) To obtain some relief from the present vexatious system of testing, which is a constant source of worry and anxiety, and is at the same time detrimental to the public interest. (*c*) To repeal the provision in the Scheme of Amalgamation of 1880 limiting the amount of the Directors' fees, and to fix a new limit bearing some proportion to the increase of the business.

The principal portions of the accounts are as follows:—

The first two statements relate, as usual, to the stock and loan capital. The former sets forth that the standard rate of 4 per cent. is payable on £5,850,000 of stock; while the latter shows that the loan capital, the rate of interest on which is 3 per cent., amounts to £1,627,965. The third statement is the capital account. It stands as follows: Amount received, £4,372,892; nominal amount added by conversion (less premium), £3,105,073—total, £7,477,965. The items of expenditure are as follows:—

Capital account to June 30, 1901		£4,141,173 0 7
Expenditure during half year to Dec. 31, 1901, viz.—		
New buildings and machinery in extension of works	£37,431 14 3	
New and additional mains and services	29,137 1 7	
New and additional meters	16,965 0 9	
New and additional stoves	21,381 18 7	
		104,915 15 2
Total expenditure		£4,246,088 15 9
Balance		126,803 4 3
		£4,372,892 0 0
Nominal amount added by conversion, less premium		3,105,073 0 0
Total		£7,477,965 0 0

The following is the revenue account :—

Expenditure.

Manufacture of gas—			
Coal into store, including £28,020 4s. for labour	£386,265 7 1		
Purification, including £8827 4s. 1d. for labour	24,282 0 11		
Salaries of Engineer and Officers at works	9,981 4 2		
Wages (carbonizing)	68,445 16 8		
Repairs and maintenance of works and plant, including £57,530 0s. 2d. for labour, less £2893 13s. 6d. received for old materials	113,436 1 11		£602,410 10 9
Distribution of gas—			
Repair, maintenance, and renewal of mains and service-pipes, including £17,530 7s. for labour	£27,632 4 8		
Salaries and wages of officers, including Rental Clerks	11,669 7 5		
Repairing and renewals of meters, including £2297 14s. 10d. for labour	17,480 11 11		
Repairing and renewals of stoves, including £7806 17s. 11d. for labour	16,321 8 1		73,103 12 1
Public lamps—			
Lighting and repairing, including £11,531 4s. 9d. for labour			17,065 1 11
Rents, rates, and taxes—			
Rents payable	£1,175 3 8		
Rates and taxes	32,270 19 8		33,446 3 4
Management—			
Directors' allowance	£1,805 18 6		
Salaries of Secretary, Accountant, and Clerks	2,628 2 11		
Collectors { Ordinary	4,982 7 0		
Collectors { Slot meter	4,592 11 9		
Stationery and printing	2,843 1 11		
General charges	7,606 4 8		
Company's Auditors	112 10 0		24,570 16 9
Law charges	£598 1 5		
Parliamentary charges	675 1 3		1,273 2 8
Bad debts			3,276 2 9
Pensions and officers' and workmen's superannuation, sick, and accident funds			5,598 3 6
Gas Referees and Official Auditor			264 2 4
Total expenditure			£761,007 16 1
Balance carried to net revenue account			156,937 1 10
			£917,944 17 11

Receipts.

Sale of gas—			
Michaelmas at 2s. 3d. per 1000 feet	£224,685 12 7		
Christmas at 2s. 3d. per 1000 feet	361,891 17 7		
	£586,577 10 2		
Public lighting and under contracts, including labour, repairing, materials	29,017 14 3		£615,595 4 5
Meters in use (232,246)—			
Company's meters at rent: Ordinary, 99,563; slot, 123,127	£23,277 0 8		
Company's stoves at rent: Ordinary, 55,019; slot, 99,726; fires, 13,714	19,202 16 9		42,479 17 5
Residual products—			
Coke, less £1993 4s. 4d. for cartage; £16,089 13s. 4d. for labour, &c.	190,447 10 4		
Breeze, less £552 7s. 4d. for cartage; £3666 1s. 6d. for labour, &c.	5,972 10 10		
Tar, less £145 4s. 9d. for cartage; £169 18s. 8d. for labour, &c.	21,824 11 3		
Ammoniacal liquor, less £163 8s. 5d. for labour, &c.	10,675 7 7		
Sulphate of ammonia, less £7172 10s. 2d. for acid, &c.; £3088 6s. 5d. for labour, &c.	29,412 17 3		258,332 17 3
Rents receivable			1,466 6 4
Transfer fees			70 12 6
Total receipts			£917,944 17 11

The net revenue account stands as follows :—

Balance from last account		£165,615 16 9
Less dividend for the half year ending June 30, 1901, and fine (£2) for deficiency of illuminating power		144,047 2 6
		£21,568 14 3
Amount from revenue account		156,937 1 10
Interest on banker's balances		222 1 4
		£178,727 17 5
Interest on temporary loan and deposits		£5,016 16 3
,, on debenture stock		24,419 9 6
Balance applicable to dividend on the ordinary stock		149,291 11 8
		£178,727 17 5

Following this are the statements relating to the reserve, renewal, and insurance funds. They show that the balances on Dec. 31, 1901, were as follows: Reserve fund, £136,811; renewal fund, £21,452; insurance fund, £70,389.

The statements relating to manufacture are as follows :—

Statement of Coal, &c., Used.

Description.	In Store June 30, 1901.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store Dec. 31, 1901.
	Tons.	Tons.	Tons.	Tons.	Tons.
Newcastle coal	56,495	627,213	599,017	598	84,093

Statement of Residual Products.

Description.	In Store June 30, 1901.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1901.
Coke—cwts.	143,600	7,406,570	2,008,946	4,987,024	554,200
Breeze—yards	11,889	155,585	45,056	101,120	21,298
Tar—gallons	624,009	5,355,307	267,861	5,212,673	498,782
Ammoniacal liquor—butts	12,812	178,431	112,898	49,154	29,191

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights (estimated).	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
5,965,322	224,609	5,283,340	5,598,759	21,746

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal and enriching materials, £54,603; coke and breeze, £19,512; tar, sulphate, and ammoniacal liquor, £11,804; and sundries, £214,012. The figures this time last year were: Coal, &c., £134,599; coke and breeze, £21,717; tar, sulphate, and ammoniacal liquor, £15,068; and sundries, £183,647. A sum of £6105, workmen's bonuses and savings, has been deposited with the Company; and the total of the officers' superannuation and guarantee funds is £22,607. Appended to the accounts is the certificate of Sir R. Giffen, the Official Auditor, who points out that a forfeiture amounting to £5, incurred during the half year, must be paid out of the divisible profits, and by way of reduction of dividend.

CRYSTAL PALACE DISTRICT GAS COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors of the above-named Company will present at the half-yearly meeting on the 14th inst., they state that the reduction of 3d. in the price of gas which was made at Midsummer, bringing it down to 2s. 7d. per 1000 cubic feet, was at once followed by increased consumption, which for the past six months was about 6½ per cent. in excess of the corresponding period of 1900. The saving in the cost of coal was rather more than balanced by the reduced receipts for gas, coke, and tar; but there was a surplus of undivided profits brought forward from the June half year, which will enable the same dividend to be paid without depleting the reserve fund. The Directors therefore recommend a dividend at the rate of 5 per cent. per annum on the ordinary stock, and 5 per cent. on the preference stock, less income-tax as usual. They express their pleasure in informing the proprietors that the general working of the undertaking is satisfactory, all the plant being maintained in good order, and the officers and workmen doing their duty in a cheerful spirit of loyalty to the Company. The demand for gas by means of the penny-in-the-slot meter continues to increase. The number of these meters in use on Dec. 31 last was 12,637, and with five-sixths of them a gas cooking-stove is supplied, to the advantage both of the consumer and the Company.

The accounts accompanying the report show that £9693 was expended last half year on capital account—divided pretty equally between new buildings and plant, mains and services, meters, and stoves; bringing up the total capital expenditure at the end of the year to £756,108, and leaving a balance of about £2420. The revenue from the sale of gas was £77,903; from the rental of meters and stoves, £4352; and from the sale of residuals, £23,993—the total revenue being £106,256. The following are the chief items of expenditure on manufacture; Coal, £46,612; oil, £3284; purification, £2747; do. oil gas, £261; salaries and wages, £8993; repair and maintenance of plant, £12,907—total, £74,804. The expenses of distribution came to £6953; of management, to £3603; profit-sharing and the superannuation and other funds took £1583; and the total expenditure was £90,823—leaving a balance of £15,433 to go to the net revenue account, which shows a sum of £15,538 applicable for distribution. The general balance-sheet sets forth that the workmen's bonus and savings deposited with the Company amount to £3381; and the officers' superannuation fund reaches £1910. The statements relating to manufacturing operations show that under the supervision of Mr. S. Y. Shoubridge, the Company's Engineer, 59,396 tons of coal, 134,904 gallons of gas oil, and 160 gallons of carburine were employed in the production of 644,086,000 cubic feet of coal gas and 48,908,000 cubic feet of oil gas (17-candle), making together 692,994,000 cubic feet, of which 607,419,000 cubic feet were sold and 615,853,000 cubic feet accounted for. The statement of residuals for the half year shows that 712,752 cwt. of coke and 20,280 yards of breeze were produced, of which quantity it is estimated that 23,393 cwt. and 820 yards respectively were employed for making oil gas. There were 636,775 gallons of tar produced from the coal, and 12,141 gallons from the oil used. The make of ammoniacal liquor was 12,090 butts; and of sulphate of ammonia, 427 tons.

BRENTFORD GAS COMPANY.

Half-Yearly Report and Accounts.

The accounts to be presented at the half-yearly general meeting of the above-named Company next Friday show that the sale of gas for public and private lighting in the six months ending Dec. 31, produced a revenue of £140,329, compared with £128,921 in the corresponding period of the previous year; the rental of meters, fittings, and stoves, £12,714, against £11,605; the sale of residual products, £28,737, against £35,236; and the total receipts were £181,831, against £175,807. On the expenditure side of the revenue account, the manufacture of gas cost £100,784, compared with £97,514; distribution, £20,927, against £20,548; management, £8297, against £7794; and the total expenses came to £139,502, compared with £135,306. The balance carried to the net revenue account is £42,329; whereas a twelvemonth ago it was £40,501. This account shows a sum of £74,049 available for distribution; and the Directors will recommend the declaration of dividends (subject to income-tax) at the rates of 5 per cent. per annum on the preference stock, 12 per cent. on the consolidated stock, and 9 per cent. on the new stock, 1881. The Directors express their pleasure

in again reporting a very satisfactory increase in the sale of gas last half year, amounting to 8·9 per cent. over the corresponding period of 1900. The works, both at Brentford and Southall, are in efficient order; and the new retort-house in process of erection at the latter place is making progress. Under the supervision of Mr. James Husband, the Company's Engineer and Manager, 70,122 tons of coal, together with "Solar" oil equal to 25,260 tons, were used in the past six months in the production of 1,024,655,000 cubic feet of gas, of which 950,591,000 cubic feet were sold, and 963,591,000 feet accounted for. The residuals produced were: Coke, 43,829 tons; breeze, 5496 tons; tar, 696,030 gallons; ammoniacal liquor, 17,753 butts of 108 gallons.

BROMLEY GAS CONSUMERS' COMPANY.

Half-Yearly Report and Accounts.

The accounts to be presented at the ordinary general meeting of this Company next Thursday show that the revenue in the six months ending Dec. 31 amounted to £27,740 odd, and the expenditure to £20,229; leaving £7511 to be carried to the profit and loss account, the balance of which is £8563. The Directors recommend the declaration of dividends, under the sliding-scale, at the rate of 12 per cent. per annum upon the original 10 per cent. capital, and 9 per cent. per annum upon the ordinary 7 per cent. capital (both subject to income-tax). This will absorb £6728, and leave a balance of £1840 to be carried forward. Under the supervision of Mr. W. Woodward, the Company's Engineer, 13,428 tons of ordinary coal and 60 tons of cannel were carbonized during the six months; the quantity of gas produced being 135,279,000 cubic feet, of which 124,103,100 cubic feet were sold. The residual products were: Coke, 13,488 chaldrons; breeze, 127 chaldrons; and tar, 121,032 gallons. There were 22,000 gallons of ammoniacal liquor and 55 tons of sulphate in store on June 30; 51 tons of sulphate were made and 46 sold in the six months; and at the close of the year the stocks were 60 tons and 48,000 gallons respectively. In their report, the Directors record the continued growth of the Company's business; the increase in the half-year's make of gas being 7 million cubic feet compared with the second half of 1900. They refer to the circumstances under which they are applying to Parliament for further capital and other powers.

THE PRICE OF GAS IN NORTH LONDON.

Conference to be Convened.

At the Meeting of the London County Council last Tuesday—Mr. A. M. Torrance in the chair—the Public Control Committee presented the report referred to in the "Journal" for the 28th ult., one paragraph of which, given in that issue (p. 223), concluded, it may be remembered, with a recommendation that the Committee should be authorized to convene a conference of representatives of the Corporation of London and the Borough Councils in the district north of the Thames, supplied by the Gaslight and Coke Company, to consider the present high price charged by the Company, and matters relating thereto, as well as the course to be adopted to obtain a reduction.

Mr. W. C. Johnson (the Chairman of the Committee) having moved the reception of the report,

Mr. R. Melvile Beachcroft remarked that it was a most valuable one, and equally valuable was that of the Comptroller. The question had been a prominent one for so long that every member of the Council was fully acquainted with it. There had been several conferences on the matter. The first one he remembered was held in the Holborn Town Hall in 1894; and there was one by the present Council in 1898. At the urgent request of a member of the London County Council—Mr. B. L. Cohen—a Select Committee of the House of Commons was appointed to consider the whole question; and he thought the result was to show that the sliding-scale was rather an undesirable arrangement, and that it ought to be modified in order to suit the present requirements of the case, particularly with reference to the Gaslight and Coke Company, and, further, that the management of the Company was wholly inadequate and unsatisfactory. The Committee said that probably alterations of the sliding-scale might be made when the Company went to Parliament for powers. They went in 1899, 1900, and 1901, and on each of these occasions Parliament threw out their Bill; and the Council were now face to face with a position of things which was very remarkable. The Company were not promoting a Bill this session; and, according to the Comptroller's report, the intention of the Company was to sell such of their assets as were available, in order to provide the needful capital to enable them to go on with their work without going to Parliament again at present. The Council were therefore in the position of having to wait two or probably three years, or even more, before any opportunity would be afforded Parliament for revising the sliding-scale. In the meantime, the electric light had to some extent supplanted gas for illuminating purposes. This met the case of those who had to depend upon that light; but for heating and cooking purposes, and to some extent for motive power, the use of gas was so greatly in excess, that he was told that, in the case of the South Metropolitan Gas Company, 50 per cent. more gas was employed now than before, and the greater portion of it for the particular purposes to which he had alluded. The matter was therefore one of great public importance, and one to which the Council might well give their best attention. The question was what they could do at the present moment. The Committee proposed that they should call a conference of the Corporation and the Borough Councils. He did not like to say a word against the conference, but he would remind the Council that they had very lately had one or two conferences on the subject. They had two in 1900—one convened in that hall, and the other by the Corporation of London at the Guildhall. The conclusions arrived at by these conferences were almost identical. One of them was prepared, in the first instance, to go a little further than the other. In fact, if he remembered rightly, the conference held in that hall discussed the question of urging the Council to go for the purchase of the gas undertakings. He would not say anything about purchase, because he hardly thought they were quite ready at the present moment to take up the question; but there was one which he did think they ought to consider, and that was whether the time had not arrived when the sliding-scale should be got rid of altogether, and they should revert to the old system under which the consumer obtained all the profit over and above 10 per cent. He believed that would be the most beneficial arrangement to the consumers of London. They know this—that the effect of the establishment of the sliding-scale had been to put £3,500,000 in the shape of dividends over and above the 10 per cent., into the hands of the three London Gas Companies; and he could not but think that the benefits the consumers had derived had been altogether unimportant compared with those conferred upon the Companies. What were the Council to do? The decision of the Committee, to invite another conference of the Local Authorities, was rather a weak one. The Council knew beforehand that they would all say the same thing. They knew that they would all be unanimous, as they were in 1900, in expressing the hope that the Council should do the best they could to bring about an alteration. If he might venture to make a suggestion, he would much rather cause a communication to be at once sent to the President of the Board of Trade, who, they knew, was in sympathy with them on this matter, accompanied by a copy of the Comptroller's latest and most valuable report, which really contained a summary of the whole case, with an intimation that the Council would be glad to know whether the Government would initiate early legislation on this subject. With this view, he would move, as an amendment: "That a communication be addressed to the President of the Board of Trade, forwarding a copy of the Comptroller's report, and urging that a remedy for the present highly unsatisfactory state of affairs is urgently needed; and also asking whether there is any likelihood of the Government dealing with the subject by legislation."

Mr. F. Dolman seconded the amendment. He said he had it in his own mind that the present position of affairs called for much more decided action than that recommended by the Committee. The Council had in their possession the views of the Local Authorities, which, to a large extent, were endorsed and strengthened by the recommendations of the Select Committee of the House of Commons; and having regard to these circumstances, he thought they should be able to present a very strong case to the Government in favour of legislation.

Mr. Johnson said he thought the Council would recognize that a recommendation from a conference of Local Authorities in London would go with greater weight to the Government than the very able report by the Comptroller, which he was glad Mr. Beachcroft had spoken of in such high terms. He considered that the united voice of London would carry greater weight than a mere recommendation from the Council. They had no reason for supposing that the Local Authorities in London had changed their views on this matter, except in the way of strengthening them—holding them rather more strongly than they did before. The recommendation of the Committee was one which he thought the Council should adopt; and therefore he could not accept the amendment. He thought no time would really be lost by the course the Committee suggested, because in all probability when calling the conference, they would address a communication to the President of the Board of Trade, and learn whether he would be willing to facilitate legislation by his own Department or by any other Department of the Government.

The Chairman then put the amendment; and on a show of hands it was declared to be lost.

The Committee's recommendation was thereupon agreed to.

SOUTH STAFFORDSHIRE MOND GAS COMPANY.

The First Ordinary Meeting of shareholders in the South Staffordshire Mond Gas (Power and Heating) Company was held on Tuesday last, at the Westminster Palace Hotel—Sir Benjamin Hingley presiding—for the purpose of fixing the number of Directors, electing Directors and settling their remuneration, appointing Auditors, and fixing the remuneration of the Secretary.

The Secretary (Mr. Ernest Crewdson) having read the notice convening the meeting,

The Chairman said the business was really quite formal, and therefore he would not indulge in many observations. On the contrary, he thought the less said the better. The members of the Board were practical men; and their business was now to carry out the objects of the Company. As for anticipations, the Directors believed in the future of the undertaking; otherwise they would not have joined it and invited the public to come in. But it was really a matter of faith and patience. They had to establish the business, select sites (which had been preliminarily done), and erect the works; also, what was still more important, they had to obtain customers for the gas. In all undertakings of this kind, it was necessary to await development. It would take time—a considerable time—and it was vain to expect any immediate results. He hoped no shareholders had joined in the anticipation that there would be an early dividend. On the contrary, they must all, as he had said before, exercise patience and faith in the future. The original promoters satisfied themselves in every possible way that the process in operation at Messrs. Brunner, Mond, and Co.'s works at Winnington would be beneficial, not only to the manufacturing district to which most of them belonged, but also to the shareholders eventually. If they could depend upon figures, the undertaking would certainly be profitable to the full extent allowed by the Act. Parliament was very conservative in dealing with gas undertakings; and they had limited the dividend to 10 per cent. and a reserve. Therefore, when they paid 10 per cent., it would be their duty to lower the price of gas. But first of all they must obtain this dividend; and when they met again twelve months hence, he hoped to be able to report that they had the works, not in successful and profitable form, but well established. They anticipated that it would take two or three years to complete them; but if the scheme proved successful, there was ample scope in the district for much more than was provided for in their present arrangements. He was very glad to say that Dr. Mond,

whom they all thoroughly believed in, had paid a personal visit to the whole of the district; and he was perfectly satisfied. At any rate, he (the Chairman) could do no more that day than assure the shareholders that, so far as it rested with the Directors—or those who were to be Directors—they would do their best to bring the Company to a successful stage, and to do this in an economical manner. They would make a small beginning; but in course of time he had no doubt the undertaking would so increase as to demand the whole of the capital set forth in the prospectus. The shareholders who had ventured, he hoped would reap the reward of their venture; but still he would impress upon them the fact that, in all such concerns, they must allow time for development, and there must be patience exercised—not an immediate return expected. However, the opinion of the Board was that the prospects were very fair, and that the Company would be successful and of great benefit to the district they intended to supply.

Mr. WESTROPE said it would be interesting to him to know what response had been made by the public—whether the shares were fully allotted, and, if not, how many remained unallotted.

The CHAIRMAN replied that the shares taken up by the public amounted to £300,000; and in addition there were the shares allotted to Dr. Mond under the agreement. Of this amount, £2 per share (or £60,000) had been paid up.

Mr. GARRAWAY asked what the Board intended to do with the unallotted shares.

The CHAIRMAN said this depended upon whether the money was wanted in the future. They first of all had to spend £300,000; and they did not ask for more at present.

Mr. GARRAWAY: You asked for £450,000.

The CHAIRMAN replied that that was so; but just now they were satisfied with the £300,000, which would suffice to develop the works to a very considerable extent. For his part, he did not wish for any more money to be subscribed. When more was required, they would call up the remaining £240,000 on the shares already allotted; and not until this had been done would any further shares be issued. He did not think it would be necessary for some months to make another call of £2.

Mr. M. ZOSSENHEIM said he thought the shareholders would be glad to hear Dr. Mond express his confidence in the future of the undertaking with more emphasis than the Chairman had done. It was Dr. Mond's invention, and they relied upon this gentleman to carry out what was promised in the prospectus. All who had subscribed had full confidence in Messrs. Mond—that they would not go into the scheme unless they were fully convinced in their minds. It was not a speculative business. People investing were assured that it would be successful; and the prospectus stated that the system had been tried, and carried on. He himself subscribed—and he believed everybody subscribed—to the undertaking in consequence of the fact that Messrs. Brunner, Mond, and Co. knew it was a successful method. If they had worked the plant successfully, he did not see why the Chairman should speak as if the results of the installation were a matter for speculation.

The CHAIRMAN said that those associated with the business had paid a special visit to Winnington, and satisfied themselves of the success of the plant there. He might also point out that there was such confidence regarding the matter in the Midlands that several subsidiary works were being established under licence. One of the Directors had arranged to spend nearly £20,000 in this way. The Board were satisfied that the prospects of the Company were very good; but what he wished to say was that the shareholders must not expect any immediate return—that it would take time to establish the business. With regard to the outlook, he had no doubt whatever in his own mind; but they must have an opportunity to develop the business.

Mr. PURKISS asked whether the dividend of 10 per cent. would be cumulative, and how soon the Directors expected that the Company would be in a position to supply gas.

The CHAIRMAN said the dividend was not cumulative. They expected to supply gas within the second year.

Dr. MOND said he could not admit that he was called upon to do what Mr. Zossenheim had suggested—namely, confirm the statements made in the prospectus which the Directors had jointly published. He was sorry that anyone had thought it necessary to ask him to do this; and he declined to do it. Those present had chosen to join in an enterprise which was to an extent a pioneer. The production of gas from cheap coal, and the recovery of valuable bye-products at the same time, had been in successful operation for a great number of years, not only in the works of Messrs. Brunner, Mond, and Co., but also by a considerable number of other firms in England, in the United States, and elsewhere. But this Company was practically the first that had been formed to sell the gas to other consumers. Up to now, all who had thus manufactured gas and bye-products had done so for their own consumption. There was another undertaking in the country which was soon to be formed into a public company, with the same object in view as they had, but to a more limited extent—for the supply of the Trafford Park district in Manchester. The South Staffordshire Company had, of course, only just raised their capital, and they had now to go into all the details of laying the mains, &c., in a district of 120 square miles. They had to work out a comprehensive system of mains to connect the different consumers with the various stations at which the gas was to be produced. They had also to erect the works; and anyone who had a knowledge of the time required to build works on a green field—works of considerable magnitude—and to lay a large system of mains through a district to supply gas at a great distance, would be aware that it took a long while. He must therefore fully endorse what the Chairman had said—that the shareholders must be prepared to wait until the works had been erected and the mains laid. The Company were in this respect in exactly the same position as a gas, water, or railway company—in fact, in the condition of every company commencing a new industry—and he should not have thought that it was necessary to point out so distinctly to an assembly of practical men that, in establishing a new business they must wait a certain time before profits could be earned. The district over which the Company had obtained powers from Parliament was the most favourable one for an undertaking of this sort that he had ever met with—and he had seen a great deal of the world. Small coal of very suitable quality for their purpose was obtainable in large quantities at moderate prices. There were very many works to which the gas would be a great boon; and they would be able to pay a good price for it, and still reap considerable advantage over their present methods of producing power. He had therefore not the slightest doubt that in time the undertaking would be a very flourishing and very big one indeed. A question had been asked as to the amount of capital actually subscribed by the public, and as to future issues of shares. He wished to say that the Directors were told, when the prospectus was brought out, that the time was unfavourable for obtaining capital, and that they were on all sides advised to wait. The Board, nevertheless, decided to the contrary; feeling that as Parliament had entrusted them with the carrying out of the scheme, they ought not to fritter away the time fixed during which the installation had to be put up, and that they would rather trust to the good sense of the public to come forward and subscribe for a scheme which had received parliamentary sanction than have regard for the state of the Stock Exchange. The consequence was that they had not obtained all they would have liked; but they had sufficient to make a start on a scale which, in his opinion, would quite suffice to earn a dividend on the capital so far subscribed. The Directors were confident that, if the demand for gas increased when the concern was in working order, there would be no difficulty in raising the balance of the capital, so as to supply as much gas as the district would consume.

It was then agreed that the number of Directors should be eight, those named in the prospectus being afterwards elected; that the fees payable to the Directors should be £250 each per annum (with the exception of the Managing-Director), and that an additional £250 a year be paid to the Chairman; that the Managing-Director (Mr. Edmund Howl) should receive £1000 per annum; that Messrs. Crewdson, Youatt, and Howard and Messrs. Gibson and Ashford be elected Auditors—their remuneration to be fixed at the next general meeting; and that a permanent Secretary and Assistant to the Manager be appointed, at a salary not to exceed £400 a year.

The CHAIRMAN, in answer to a question, said the Company were compelled to have an Act of Parliament, because otherwise they would have had no power to break up the streets. There could be no competition in the way of selling this gas in the district; but other undertakings might be established under licence from the Company and Dr. Mond. Half the proceeds of such licences would come to the Company, and the other half would go to Dr. Mond. One or two licences had already been granted.

The proceedings concluded with the customary complimentary vote to the Chairman and Directors.

THE FUTURE OF THE WELSBACH COMPANY.

An article on the present crisis in the Welsbach Incandescent Gas-Light Company's affairs, which appears in the last number of "Die Finanz-Chronik" (London), is characterized by a directness and originality which raise it above the common order of such criticisms. For this reason, we give below a translation of a large part of the article. It will be seen that, in some particulars, it supports the views expressed by Mr. F. D. Marshall in his letter to the "JOURNAL" last week (*ante*, p. 214).

Our contemporary says: The financial papers are divided into two camps; some being for the Directorate and the others for the Advisory Committee. We adopt an independent position distinct from either of these groups. It must be granted that the business of the Company has been conducted extremely badly in the past, and that there is ample scope for reform. We admit also that, with a managing body composed of business men—some having practical knowledge and experience of the gas branch—the Company can certainly increase their profits. At the same time, however, we are convinced that no administration will be in a position to furnish a dividend on a capital of £3,500,000 sterling. In our view, the capital question is the predominant one. . . . The Directors are to be greatly blamed for not having started and carried on the undertaking on a business footing. Hostility to the gas companies was a great hindrance to business, and has cost the Company much money. Even when the Advisory Committee somewhat belatedly proposed a closer connection with the gas companies, the Directors replied that the interests of the gas companies were not the same. At the general meeting also we heard that the "trade" had found the present Directors hopeless. For a long time the Directors relied on the patents, and resisted any reduction of prices. . . . Now all this is changed. All agree that the price of the mantles must be reduced. We must be prepared for the time when the 1893 patent will have expired, and the Company must work independently of patent protections. We need not be anxious about a large company being started to compete—the danger lies in the starting of many small companies, which will spring up immediately the patent expires. Very exaggerated ideas prevail generally on the mantle business. Anyone can start a very decent factory on £500; and with £2000 anyone can equip a factory which can seriously compete with the Welsbach undertaking. The whole manufacture is extraordinarily simple. Neither the special woven fabric, nor the special fluid, need be manufactured. Even our large Company with a capital of £3,500,000 sterling buys the woven fabric ready-made in Germany, and the fluid in Vienna; and anyone can do likewise. The manufacture consists in dipping these fabrics in the solution, burning them off, and packing and despatching them. All these operations are so simple that a girl or youth can in a few months become a dexterous worker. But as the whole procedure is so extremely simple, we must not be surprised if the gas companies here, as abroad, themselves undertake the manufacture. There was once a time when the production of a good mantle was found to be difficult, and that of the Welsbach Company was certainly the best in the market. But times are changed, and there are now very many mantles in the market which are as good as, if not better than, the Welsbach. In fact, the extraordinarily high price, and the false policy of the Welsbach management, have retarded the spread of incandescent lighting in this country. We know of no other country in the world in which

the incandescent light is so little disseminated as in England. Under such circumstances, the possibilities are naturally very great; but the *sine quâ non* is a cheaper price. There are but two ways of making the business—either to trust to the patents and fix a high price, or to compete with other producers and fix cheap prices. The first way has proved itself a mistake, and it can only be pursued for a short time—*i.e.*, until the expiry of the 1893 patent. There remain, therefore, only free competition and cheap prices. We must come to the point when the profit is set down at only 1d. per mantle, or even less. The profit on a sale of one million mantles would then run to about £4000; and many millions would be necessary to provide a dividend for a capital of £3,500,000. We know that there are about 600,000 gas consumers in England. How many mantles will each of these consumers need to take in order to put us in a position to find a dividend for the capital of the Company? The advisors of the Company cannot work miracles. The proprietors of ordinary stock and deferred shares must give up any idea of dividends. The proprietors of preference shares may expect a small dividend, but not one in proportion to their nominal capital. For some years, a substantial sum has been received from the Austrian Company; but this source of income will diminish rapidly, and in a few years' time will have dwindled away to a mere trifle. It is the same with other concerns in which the Welsbach Company have an interest. . . . It has been remarked that the foreign Welsbach Companies pay satisfactory dividends. But the capital of these Companies is ten to twenty times less than that of the English Company; and consequently they can more easily maintain their dividends at a sufficiently high rate. With a capital of £500,000 even, the English Company might pay.

THE FATAL GAS EXPLOSION IN BOSTON (U.S.A.).

Edison Company Liable with the Gas Company.

Many of our readers will doubtless remember the circumstances attending the serious explosion which occurred at the intersection of Tremont and Boylston Streets, Boston (U.S.A.), on March 4, 1897, causing the death of six persons, serious injury to about forty others, and the destruction of three street cars and two carriages. The facts were fully reported in our columns at the time. With the view of obtaining compensation for the sufferers and the representatives of those whose lives were sacrificed, a case was taken to the Courts. A young bootblack, named Wolf Koplan, who was standing near the scene of the explosion, was thrown down and slightly injured; and on his behalf an action was brought to recover $10,000 damages. The result was a decision fixing the liability upon the Boston Gas Company, as recorded in the "JOURNAL" for Nov. 20, 1900 (p. 1281). It was generally supposed, at the time of the trial, that the issue of liability had been finally settled; but it subsequently transpired that the case was not a test one, as Counsel feared to bind his client to the first adjudication on a matter of such importance. The Metropolitan Construction Company, the West End Street Railway Company, and the Edison Electric Illuminating Company were absolved from blame by the Jury; the Court having ordered a verdict for the Edison Company at the close of the plaintiff's case, owing to a want of evidence against them. The Gas Company set up the defence that the gas which caused the explosion was generated from a substance in the Edison Company's tubes; but as the Company were out of the trial, by reason of the decision of the Court, before the Gas Company put in their defence, the Jury could not hold them liable, even if they had felt that they were so.

Mr. Walter I. Badger, who was associated with Mr. R. M. Morse in that trial, subsequently took proceedings against the Edison and West End Companies alone. He told the Court at the preliminary hearings that he would yield to almost any suggestion so long as he was afforded another opportunity for a trial with the Companies, providing the Edison Company should stay in the case till the end. He declared at one hearing that his Company would abide by the result of that trial; and at last his wish was gratified. He went to trial before ex-Judge Dunbar as Auditor, with the two other Companies as joint defendants. A batch of cases were submitted to him; and, after an investigation extending over 90 days, he found the Gas Company and the Edison Company jointly liable.

It appears, from a Boston paper just to hand, that it was the purpose of the Edison Company to fight the question of liability to the end; and since the opening of the Court towards the close of last year, the matter of facilitating and expediting the trial of cases was considered by Counsel for all parties. It was determined finally that two Judges should hear a number of cases, in place of a Jury; and the matter of liability would again be pronounced upon. Several of the Counsel did not approve of this plan; so it was decided to go to trial before the Judges. The matter was set down for the 6th ult., but was adjourned first to the 13th and then to the 20th. The reason for these postponements was that negotiations were on foot which it was thought might lead to a settlement. Counsel for the Edison Company finally yielded to what was deemed to be the inevitable; and taking into account the probable confirmation of the finding of ex-Judge Dunbar and the cost of the trial, the Company decided to share the damages to be awarded to the several plaintiffs. It cannot yet be ascertained exactly what amount the Companies will have to pay; but although the total damages in all the cases, numbering considerably more than a hundred, exceed $1,500,000, it is extremely improbable that the entire amount of compensation to be paid will reach $500,000. We learn that already a large number of cases have been settled; and it is not improbable that those pending will be similarly disposed of, with the result that the most important litigation, from the point of view of the general public, that has been in the Courts for a long time will be speedily terminated.

According to the Central News, the Swansea Corporation, on the advice of the Governor of the Bank of England, have decided that the clauses in the Bill they are promoting, proposing to substitute redeemable for irredeemable stock, to which reference was made in the "JOURNAL" a fortnight ago, shall be withdrawn. The proposal met with much criticism and opposition on the Stock Exchange.

GRAVESEND PUBLIC LIGHTING.

The Weighting of the Governors.

We published in the "JOURNAL" for the 21st ult., a report of a meeting of the Gravesend Town Council at which was considered a complaint made by the Gas Company that many of the governors on the public lamps had been deliberately tampered with. After hearing the explanation of the Gas Inspector (Mr. Driver), the Council referred the matter back to the Paving, Lighting, and Works Committee; and the Committee, after further consideration of the subject, have recommended "that the Town Clerk should inform the Gas Company that they regretted that, through the inadvertence of the Gas Inspector, an error had been committed, and that they had given instructions that it be not repeated." On this recommendation coming up for discussion at the following meeting of the Town Council,

Alderman FLETCHER asked if the Council really agreed to express regret for their "inadvertence." The word seemed a rather curious one to use. It was hard to believe that it was through inadvertence that the pieces of wire was found on the gas-regulators—that it was through inadvertence that S hooks were carried out by the lamp-cleaner. Was it not rather ridiculous to send such an excuse to the Gas Company? For it was an excuse. There was an old motto which he learned when he was very young, and that was "Tell the truth and shame the devil." It did not seem that the Corporation believed in in that motto—or, at any rate, the members of the Committee.

Mr. DAVIS said he could not allow that rebuke to pass unnoticed.

The MAYOR: It is not personal.

Mr. DAVIS said he spoke as a member of the Council. He thought they had properly met the Gas Company, who used a very harsh expression; and it would have been better to let the whole matter drop. Here the Alderman brought the matter up again, and caused friction and unpleasantness in the Council which should not exist. If a mistake had been made by the Gas Inspector, a greater error had been made on the part of a Gas Company's servant or Secretary by writing in the terms he did. If there was to be a withdrawal, the Council should insist on the withdrawal of the accusation of "gross fraud" made against the Gas Inspector and the Corporation. If Alderman Fletcher was dissatisfied, and an alteration were required, he would move an amendment requiring a withdrawal of the accusation.

Mr. COBHAM: If Councillor Davis moves an amendment, I will second it.

Alderman FLETCHER: What is it?

Mr. COBHAM: That the Company withdraw the accusation of "gross fraud" against one of our Inspectors and against the whole of the Council. There was, he continued, an entirely wrong apprehension abroad as to what were used in the gas-lamps. Alderman Fletcher had spoken as if they were gas-meters. He believed these governors were the property of the Corporation, and fixed on the lamps to improve or regulate the pressure, and give a better light. He did not want to discuss whether the Gas Inspector made a mistake or not, or whether or not it was his duty to report to the Surveyor or Committee when he found that the governors did not act. But he did say that he considered the Inspector was using his best judgment in the interests of the Council and the public in doing as he did. He acted as he thought best in their interests, and had not the remotest suspicion that he was cheating anybody.

Mr. SANDFORD was sorry that this matter was re-opened. There might have been inadvertence. There was no getting rid of the fact that something had been done in a wrong way; the Council admitted that. Therefore, they said they regretted their inadvertence. What other word would they like? If they did not like the word "fraud," have some other word—say, stolen gas. From what he could hear, he understood that when the pieces of wire were put on the governors more gas passed through than the Corporation paid for. If the governors were supplied by the Corporation, and someone tampered with them, it was wrong. The Gas Company might use some other words perhaps—with the same meaning. The Inspector was to be censured by the Committee through the Borough Surveyor; and nothing of the kind was to be repeated.

Mr. DAVIS: I have yet to learn that our Inspector has been, or is to be, censured. I do not know what for.

The MAYOR suggested that the matter should not be carried any further; remarking that it would be far more dignified now to vote.

A vote was accordingly taken, and the minutes of the Committee were confirmed; only Alderman Fletcher holding up his hand against this course.

WEST BROMWICH GAS DEPARPMENT.

The Cost of Public Lighting.

The Gas Committee, in their report to the West Bromwich Town Council, state that in accordance with the decision of the Council at the meeting held on March 6 last, that the price of gas for public lighting after the present financial year should not exceed that charged by the Corporation of Birmingham for the same purpose, they have informed the Highway Committee that from April 1 next the charge would be the same as that made by the Birmingham Corporation from time to time. This charge is at present 1s. 1d. per 1000 cubic feet, with a discount of 5 per cent. The Committee have also informed the Highway Committee that they are prepared to continue the lighting, extinguishing, cleaning, and repairing of the lamps as now; charging the Highway Commmittee for such services the actual cost price. Or the Highway Committee may themselves undertake such work if they like; but in this case they would require to purchase the present lanterns and burners, which are the property of the gas undertaking. They have also intimated to the General Purposes Committee their willingness to undertake, at the expense of the Gas Department, the illumination of the fronts of the public buildings on the occasion of the Coronation of the King.

STEAM-ROLLERS AND GAS AND WATER MAINS.

Explosion at Swansea.

On the evening of Saturday, the 25th ult., the neighbourhood of the High Street, Swansea, was the scene of a violent explosion. At about half-past seven, when there were some hundreds of people in that street and Castle Bailey Street, they were startled by a loud report, accompanied by a vivid flash of fire. On investigation, it was found that the covers of some of the manholes connected with the electric light service had been blown off; and the strong odour of coal gas pointed to this as being associated with the cause. Two of the manholes were in Welcome Lane, one in Castle Bailey Street, and one in High Street,; and in all these thoroughfares quite a panic prevailed among the people, who feared that the explosion might be followed by another of even a more serious character. The police at once took steps to ascertain whether anyone had been injured, and to keep the people away from the various sources of danger. They ascertained that the Chief Assistant Electrical Engineer (Mr. Thomson), a foreman named Phillips, and a woman named Davies, had been burnt—the two former so seriously that they had to be sent to the hospital. The Gas Company's Manager (Mr. George Andrews) promptly set a gang of men at work to repair the damage; and the scene of the explosion was visited by the Chief Electrical Engineer (Mr. C. A. L. Prussman). Owing to the necessity for the exercise of care in inspecting the manholes, to avoid interferance with the electric light, it was some time before the real cause of the accident could be definitely ascertained; and then it was found that it was really due to an accumulation of gas which had escaped from the service-main, and that it was ignited by a light used in making an inspection for water in one of the manholes.

It appears that during Saturday evening the presence of a large quantity of water was observed running from the electric light mains into the trenches and the works at the electric lighting station. Pumps and buckets were used to remove it, but without success, for the flow increased; and as it was impossible, during the busiest period of the week, to continue pumping and bailing, Mr. Thomson decided to open some of the boxes to ascertain the cause. Consequently, at 7.30, accompanied by a foreman named Phillips, he went into Welcome Lane, and opened one of the boxes. According to the account given in the local paper, he lifted up the cover of the manhole, when immediately there was a rush of gas, which ignited at the lamp carried, and caused the explosion. It is stated that he had taken every precaution against accident; but as the inspection had been made at night, a light was necessary. The covers of the boxes are loose, and easily removed. Had they been fastened, the explosion might have had very disastrous consequences. As it was, the massive round covers of the manholes and showers of stones were hurled to a considerable height. Fortunately, however, no one was struck by them.

During Saturday night and on Sunday morning an excavation was made in Welcome Lane, and it was found that the gas-main near the box where the explosion originated had been fractured. Lower down the street it was also discovered that the Corporation's 7-inch water-main was broken. This accounted for the flooding of the engine-house, which is about 100 yards from the spot. For the preceding three days a steam-roller had been at work in the lane; and it is suggested that this must have caused the breakages. This theory is strengthened by the fact that their positions are not together, the fracture in the water-main being 50 yards from that in the gas-main. This pipe is 2 ft. 6 in. below the surface of the road, and the other mains are 2 feet down. The gas-main was repaired early on Sunday morning.

At the meeting of the Streets Committee of the Swansea Corporation on Tuesday, the Assistant-Solicitor (Mr. R. A. Wheatley) said the Gas Company had written to the Corporation a letter with regard to the explosion; and he suggested that it should be referred to the Town Clerk, for him to reply to it. The Chairman (Mr. T. Merrells) said a summary of the letter had been sent to the members. It was a formal notice that compensation would be claimed by the Company against the Corporation. Mr. Wheatley's suggestion was agreed to.

PRICE OF GAS AT WINNINGTON AND WIDNES.

As was naturally to be expected, the paragraph on the supply of gas at 1s. per 1000 cubic feet at Winnington, by Messrs. Brunner, Mond, and Co., which appeared in the "JOURNAL" last week, as well as in newspapers all over the country, including the "Widnes Weekly News," attracted the attention of Mr. Isaac Carr, who, in a letter to the Editor of that paper, pointed out that, in comparing the price of the article with that charged for Widnes gas, regard ought to be paid to one or two considerations in respect to the Winnington supply before declaring that the record held by Widnes for so many years has been beaten. He goes on to explain that, in the first place, the Winnington gas is a mixture of cannel gas made in the ordinary way and of the waste gases from the coke-oven plant; so that it is not on all-fours to compare it with gas-works not having the advantage of such outside assistance. Further, the distribution charges at Winnington can scarcely be said to be comparable with those of ordinary town supplies, on account of the short length of main required for distributing the gas. Out of every 1000 cubic feet of gas consumed in Widnes, practically 2d. is taken for the relief of the general district rate, or, in other words, in defraying the cost of public lighting. It would be interesting to know how much the Winnington gas contributes in this direction. The Widnes Gas-Works are conducted at a profit after meeting all indebtedness in the way of interest on capital, sinking fund, &c., as required by the Act. At Winnington there is no Act to stipulate how the finances of the works shall be controlled; and, further, the financial results are unknown. Assuming, however, that it pays to sell at 1s. per 1000 cubic feet, the fact that a portion of the gas so supplied is waste gas from the coke-ovens, renders comparison with other works somewhat difficult. Mr. Carr directs attention to the fact that some members of the firm of Messrs. Brunner, Mond, and Co., have, it is well known, vast financial interest now at stake in the flotation of companies for the supply of Mond power gas; so how much the new price at Winnington may be due to the desire to advertise is a matter for speculation, as is also the question as to whether the gas at 1s. per 1000 cubic feet is being sold at a profit or a loss. In conclusion, Mr. Carr points out that the Widnes works have for many years past not only sold, but manufactured, the cheapest gas in the world; and to make the comparison complete, the full details of the cost of manufacture at Winnington, together with the method of financing, should be stated. If the cost of manufacture at Widnes is being surpassed, the palm must be gracefully yielded; but until it is shown that this is the case, Widnes may still fairly claim to hold the record for manufacturing the cheapest gas in the world—*i.e.*, when compared with works that are self-supporting and profit making.

CHARD GAS COMPANY'S BILL.

Opposition of the Town Council—Meetings of Ratepayers.

Two Meetings of the ratepayers of Chard were held last week, to consider the question of the gas supply and the proposed opposition of the Corporation to the Bill which is being promoted for the incorporation of the Chard Gas and Coke Company, Limited, and the extension of their capital powers. The first meeting, on Tuesday evening, was convened at the instance of the Company, and was attended by Mr. H. R. CROMEY BUCK, Chairman; Mr. W. H. Fisher, Deputy-Chairman; Mr. B. Morris, Director; Mr. A. Edwards, Managing-Director; Mr. Corbet Woodall, Engineering Adviser; Mr. J. A. Forward, Solicitor; and Mr. F. Turner, Secretary. The Mayor (Mr. F. Harris Mitchell), the Parliamentary Committee of the Town Council, and other members of the Council were also present at the outset; but after the Mayor had made a brief speech, in which he complained that a number of questions put to the Company had not been answered, he and the members of the Parliamentary Committee withdrew, in order, as his Worship said, that they might not be in any way implicated in the discussion.

Mr. CORBET WOODALL then made a speech in explanation of the position and intentions of the Company. He said that originally the gas-works were the property of ratepayers of Chard; but the supply was not satisfactory, and another Company was formed. The two Companies continued for a number of years, but in the end they amalgamated. Then the works were leased, and finally another Company (the present one) was formed, and had run the works ever since. This Company had about £17,000 invested in the works and mains; and while they had no security for their property, they were under no statutory obligations to the consumers as to supply, price, or illuminating power. Among the objects of the Bill were the limitation of the amount of capital to be raised and the dividend to be paid, the fixing of a standard price, and the determination of the illuminating power and the pressure. One would think it would not want any argument as to the wisdom of placing the Company under these regulations. There was, however, room for difference of opinion; and there were two points on which the ratepayers and consumers ought to be well advised. The first was the amount of capital invested in the undertaking; the second was the standard price. Outside that, he did not know of a single matter in which the interests of the consumers were at variance with those of the shareholders. In regard to the standard price, he thought the Company were right in fixing it at the same figure as had hitherto been charged. The new capital would be offered by auction or by tender, and the Mayor and other inhabitants of the town would have equal opportunity with the present shareholders of becoming investors in the Company. A calculation had been made that when the new capital was raised the average rate of dividend would be 7 per cent. This was a mistake. Under the auction clause, the new capital would be raised at a rate of about 4½ per cent. The present capital of the Company was £150 for every million cubic feet of gas sold, which was not an extravagant amount, especially considering that there was formerly competition in the town and there were two sets of mains. The sum of £1500 had been taken out of profits and invested in the works; and the Company asked that this should be capitalized and bear dividend at 5 per cent. This was an ordinary and usual proceeding, which had hundreds of precedents, and was perfectly justified by the circumstances of the case. He hoped the points of difference between the Corporation and the Company would be amicably discussed. The Parliamentary Agents had advised from the first that the earliest opportunity should be given to the Corporation as to the notices of the proposals contained in the Bill. As far as he was concerned, he would welcome inspection of the gas-works; but probably the Directors were not doing more than was thought prudent in deciding that they would like him to come first and tell them what he thought of their position. The Corporation were invited to meet a deputation of the Directors; but the offer had been declined, as he thought very unwisely. Still, there was plenty of time between now and March to discuss anything with regard to the Bill. If they could not agree, the decision must be left to the Committee of Parliament, though he deprecated the cost of such a proceeding.

Mr. J. GRAHAM suggested that the Company should withdraw the Bill, and that other means should be taken to raise more capital if it was needed.

Mr. S. ASHFORD asked if it was true that the Company would not allow any resident of Chard to become a debenture shareholder.

Mr. A. EDWARDS replied that it was not a fact, and pointed out that under the Bill which was now being promoted everyone who was so disposed might invest in the shares of the Company. He advised the Directors that they should give the consumers and inhabitants of Chard an opportunity of investing their money in the works.

Mr. WOODALL said that, while the Bill would provide for the share capital being offered by auction, it did not provide for the sale of the debenture stock in the same way. He felt sure, however, that the Directors would be willing to agree to that; and the fact that the point had been raised showed the wisdom of such a meeting as that.

Mr. R. DWELLY, as a member of the Council, thought that body had been treated rather badly. On Dec. 4, they were told that the Bill would be in their hands within a week; but it did not reach them

until Dec. 23. How could they negotiate when they had not got the Bill? If the Company were ready to come forward and meet the Parliamentary Committee or the Town Council, he believed it would be the wish of the audience that such a meeting should take place. If not, the Corporation would fight the Bill.

Mr. A. M. GIBBS asked for information as to the effect of the provision in the Bill with regard to electric lighting.

Mr. WOODALL explained that the Company asked for power to apply for a Provisional Order if they cared to do so at some future time. It would not prevent the Corporation undertaking the work if they cared to do. Personally, he was of opinion that the only way they could hope to have electric lighting in small towns was by combining gas and electricity, and so saving the expense of two separate staffs.

Mr. DWELLY again raised the question of the willingness of the Company to meet and discuss matters with the representatives of the Corporation.

Mr. EDWARDS repeated the assurance that they were perfectly willing to do that.

Mr. WOODALL said that the price charged in Chard was fair having regard to the size of the town and the price charged in other towns; and it was justified by the fact that the Company had never paid more than 8 per cent. dividend.

No resolution was submitted to the meeting (except one of thanks to the Chairman and the representatives of the Gas Committee), which then terminated.

The statutory meeting of owners and ratepayers, called for the purpose of authorizing the Corporation's opposition to the Bill, was held on the following evening (Wednesday), and was presided over by the MAYOR.

The CHAIRMAN, after giving a short history of the gas lighting of the town, said the Bill as lodged endeavoured to secure an absolute monopoly for the Company for the supply of both gas and electricity.

Mr. J. MADGE said that on the previous evening Mr. Corbet Woodall had assured the meeting that the town would not be hampered at all in regard to the supply of electricity.

The CHAIRMAN quoted from the report of Mr. Valon, who is acting as adviser to the Corporation, the opinion that the effect of the Company's proposal would be to take it out of the power of the Corporation to deal with the question of electric lighting, and would confer an entire monopoly on the Company of the means of supplying artificial light. He calculated that to pay the statutory dividends upon the increased capital, provided there was no increase in the consumption of gas, the Company must in the past have earned sufficient to pay 28½ per cent. on their ordinary shares. As a matter of fact, the largest dividend they had paid was 8 per cent. Where was the extra profit to come from? It must come either out of increased consumption or a higher price of gas. He thought the chances were that they would have a decreased rather than an increased consumption, and that in order to pay dividends on the large capital the price of gas would be raised. It was also to be borne in mind that in improving the quality of the gas, as they proposed to do, the Company would incur additional expense, which would add to the prospect of increase in the price. It had been said that the Corporation's opposition would cost from £3000 to £4000. His own opinion was that the cost would be from £250 to £500.

Mr. A. VENABLES KYRKE, Legal Adviser to the Town Council, traversed the statement of Mr. Corbet Woodall that the Company, as now constituted, had no responsibility, and said that if they did throw the town in darkness the people would have a remedy in the formation of a new company. As to the proposed increase of capital, it was quite certain that unless the Company found a very much larger number of consumers, they must increase the price of gas. It required £915 to pay the present dividends and the interest upon the debentures; while to pay the dividends upon the proposed new capital £975 more would be needed, to meet which there would be no income available. Mr. Corbet Woodall had no right to assume that the new capital would be sought after as to command a high premium; and the Mayor was right in his calculation in taking it at par. He advised the meeting to pass the resolution and authorize the opposition to the Bill, because it would enable the Corporation to meet the Directors, if there was to be a meeting, and carry on negotiations with weapons in their hands.

Several speakers who followed, expressed the hope that there would be a conference between the Company and the Council; and the Mayor said that if the Company would meet them they would find the Corporation most amenable.

The resolution authorizing the Corporation to oppose the Bill was carried with three dissentients.

SALES OF STOCKS AND SHARES.

At the Mart, Tokenhouse Yard, last Tuesday, Mr. Alfred Richards conducted a sale of gas and water stocks and shares. Some additional ordinary £10 shares in the Lowestoft Water and Gas Company, ranking for a maximum dividend of 7 per cent. (last dividend at the rate of 5¼ per cent. per annum), fetched £12 and £12 5s. each. A few £10 fully-paid shares, carrying 7 per cent. dividend, in the North Middlesex Gas Company, were sold for £13 apiece; the purchaser taking the dividend accruing from the 1st ult. In accordance with the instructions of the Directors, Mr. Richards offered some lots of 4 per cent. perpetual debenture stock of the Great Yarmouth Water-Works Company, which fetched £110 and £110 10s. per cent. The particulars of the sale included some ordinary "B" stock of the Ilford Gas Company, ranking for a standard dividend of 3½ per cent. per annum, subject to the sliding-scale, but carrying 4½ per cent. It fetched from £85 to £86, and some "C" 5 per cent. stock (last dividend 6 per cent.) £112 10s. per £100 of stock. A few fully-paid £10 shares in the Chigwell, Loughton, and Woodford Gas Company, carrying 7 per cent. dividend, were sold, by order of executors, for £13 7s. 6d. each.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 271.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 11	10½	Alliance & Dublin 10 p.c.	18—19	..	5 10 6
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	Jan. 2	5	Australian 5 p.c. Deb. .	97—101	..	4 19 0
200,000	5	Nov. 13	6½	Bombay, Ltd. . . .	6¼—6⅝	..	4 16 4
40,000	5	,,	6½	Do. New, £4 paid	4¼—4½	..	5 9 5
380,000	Stk.	Aug. 15	12	Brentford Consolidated	265—270	..	4 8 11
270,000	,,	,,	9	Do. New . . .	192—197	..	4 11 5
50,000	,,	,,	5	Do. 5 p.c. Pref. .	130—135	..	3 14 1
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb. .	112—115	..	3 9 7
220,000	Stk.	Sept. 12	10	Brighton & Hove Orig.	210—215	..	4 13 0
246,320	,,	,,	7	Do. A. Ord. Stk. .	150—155	..	4 10 4
420,000	20	Sept. 27	10	British.	41—42	..	4 15 3
50,000	10	Aug. 15	12	Bromley, Ord. 10 p.c. .	24—26	..	4 12 4
82,850	10	,,	9	Do. 7 p.c. . . .	19—21	..	4 5 8
500,000	10	Oct. 11	6	Buenos Ayres (New) Ltd.	9½—10	..	6 0 0
220,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	94—97	..	4 2 6
150,000	20	July 17	8½	Cagliari, Ltd. . . .	22—24	..	6 17 6
100,000	10	Sept. 27	10	Cape Town & Dis., Ltd.	15—16	+½	6 5 0
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
550,000	Stk.	Oct. 11	12	Commercial Old Stock	265—270	..	4 8 11
236,425	,,	,,	9	Do. New do. .	203—208	..	4 6 7
238,237	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	130—135	..	3 6 8
800,000	Stk.	,,	9	Continental Union, Ltd.	162—167	..	5 7 9
200,000	,,	,,	7	Do. 7 p.c. Pref.	160—165	..	4 4 10
575,000	Stk.	Aug. 29	5	Crystal Palace Ord. 5 p.c.	122—127	..	3 18 9
60,000	,,	,,	5	Do. 5 p.c. Pref.	123—128	..	3 18 2
486,090	10	Jan. 30	10½	European, Ltd. . . .	18½—19½*	..	5 7 8
354,060	10	,,	10½	Do. £7 10s. paid	13½—14½*	..	5 8 8
15,243,200	Stk.	Aug. 15	4⅛	Gas-light and Coke	4 p.c. Ord. . .	97—99	+1	4 8 10
2,600,000	,,	,,	3½		3½ p.c. max. .	91—93	+2	3 15 3
3,799,735	,,	,,	4		4 p.c. Con. Pref.	111—114	..	3 10 2
4,193,975	,,	Dec. 13	3		3 p.c. Con. Deb.	91—93	..	3 4 6
70,000	10	Nov. 13	8	Hongkong & China, Ltd.	13—14	..	5 14 4
3,800,000	Stk.	Nov. 13	10	Imperial Continental .	213—216	+2½	4 12 7
473,600	Stk.	Aug. 15	3½	Do. 3½ p.c. Deb. Red.	100—102	..	3 8 8
561,000	Stk.	Aug. 29	10	Liverpool United A .	232—234	..	4 5 6
718,100	,,	,,	7	Do. do. B .	171—173	..	4 0 11
306,083	,,	Dec. 30	4	Do. do. Deb. Stk.	118—120	+1½	3 6 8
75,000	5	Dec. 13	4	Malta & Medn., Ltd. .	4½—5	..	4 0 0
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	106—110	..	4 10 11
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	Nov. 13	3½	Monte Video, Ltd. . .	9—10	..	7 0 0
1,515,892	Stk.	Aug. 9	4½	Newc'tle & G'tesh'd Con.	105—107	−½	4 1 9
312,855	ck.	Dec. 27	3½	Do. 3½ p.c. Deb.	98—100	..	3 10 0
150,000	5	Nov. 28	8	Oriental, Ltd. . . .	7½—8	..	5 0 0
135,000	4½	,,	8	Do.	6⅞—7¼	..	4 19 4
15,000	1	,,	8	Do.	1¼—1⅜	..	4 11 5
60,000	5	Sept. 27	7	Ottoman, Ltd. . . .	5⅜—6¼	..	5 12 0

* Ex. div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
851,070	10	Oct. 11	7	River Plate Ord. . .	10—10⅜	..	6 13 4
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb..	95—98	+1	4 1 8
250,000	10	Sept. 27	8	San Paulo, Ltd.. . .	11—12	..	6 13 4
135,000	Stk.	Sept. 12	10	Sheffield A	244—246	+2	4 1 4
209,984	,,	,,	10	Do. B	243—245	+1	4 1 8
523,498	,,	,,	10	Do. C	242—244	..	4 2 0
5,761,885	Stk.	Aug. 15	5	South Met., 4 p.c. Ord.	128—130	+1	3 16 11
1,627,965	,,	Jan. 16	3	Do. 3 p.c. Deb. . .	92—94	+1	3 3 10
380,940	Stk.	Nov. 13	5	Southampton Ord. . .	104—108	+2	4 12 7
70,825	,,	Jan. 16	4	Do. 4 p.c. Deb.	100—103	−3	3 17 8
120,000	Stk.	Aug. 29	5½	Tottenham and Edmonton	A. 5 p.c.	122—127	..	4 6 8
250,520	,,	,,	4		B. 3½ p.c.	95—100	..	4 0 0
182,380	10	Jan. 16	5	Tuscan, Ltd.. . . .	7—8	..	6 5 0
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	95—98	..	5 2 0
230,000	5	Aug. 15	9	West Ham, 10 p.c. . .	9¾—10¼	..	4 5 9
172,000	10	,,	6	Do. 7 p.c. . .	12⅝—13⅜	..	4 8 11
140,900	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
				WATER COMPANIES.			
780,599	Stk.	Dec. 30	11½	Chelsea, Ord. . . .	317—322	+2	3 11 5
150,000	,,	,,	5	Do. 5 p.c. Pref. .	152—157	..	3 3 8
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	140—145	..	3 2 1
175,785	,,	Sept. 27	4½	Do. 4½ p.c. Deb. .	142—147	..	3 1 3
1,720,560	Stk.	Oct. 11	7	East London, Ord.. .	197—202	+2	3 9 4
654,740	,,	Dec. 13	4½	Do. 4½ p.c. Deb. .	143—148	+1	3 0 10
1,018,046	,,	,,	3	Do. 3 p.c. Deb. .	96—98	..	3 1 3
700,000	50	Dec. 13	8	Grand Junction	10 p.c. max..	114—117	..	3 8 5
310,000	Stk.	Sept. 27	4		4 p.c. Deb..	127—132	..	3 0 7
708,000	Stk.	Aug. 15	14	Kent	300—305	..	4 11 10
160,000	,,	,,	7	Do. New, 7 p.c. max..	200—205	..	3 8 4
1,043,800	100	Dec. 30	10½	Lambeth, 10 p.c. max..	300—310	+9½	3 7 9
406,200	100	,,	8	Do. 7½ p.c. max..	217—222	..	3 12 1
350,000	Stk.	Sept. 27	4	Do. 4 p.c. Deb..	125—130	−2	3 1 7
500,000	100	Aug. 15	12⅝	New River, New Shares	395—405	..	3 3 2
1,000,000	Stk.	Jan. 30	4	Do. 4 p.c. Deb..	127—130*	+1	3 1 7
902,300	Stk.	Dec. 13	7	South-wark and	Ord. . . .	200—205	+7	3 8 4
126,500	100	,,	7		7½ p.c. max.	185—190	+2	3 13 8
489,200	Stk.	,,	5		5 p.c. Pref..	153—158	..	3 3 3
1,019,585	,,	Oct. 11	4	Vauxhall	4 p.c. A Deb.	125—130	..	3 1 7
1,155,066	Stk.	Dec. 13	10	West Middlesex. . .		300—310	+20	3 4 6
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .		140—145	..	3 2 1
200,000	,,	Sept 12	3	Do. 3 p.c. Deb. .		96—98	..	3 1 3

* Ex. div.

ELECTRIC LIGHTING NOTES.

Another Luxury at Poplar.

The writer of the column of chat in the "East End News" which professes to inform the readers of that paper as to what folks are saying, gives the following as current expressions of opinion: "That the electric light at the Poplar and Stepney Sick Asylum is an expensive luxury; that it costs nigh on 15s. a day extra as compared with gas; and that it is penny wise and pound foolish to abolish one monopoly to set up another on such extravagant terms."

Dual Lighting a Convenience.

The advisability of having a dual system of lighting where electricity is the favoured one, was illustrated at the Shakespearean Theatre, Clapham Junction, during the progress of the play last Saturday week. The electric light failed (as it has frequently done in other places of public assembly); and gas had to be resorted to, to allow of the performance proceeding. After an interval the current was restored; but it was fortunate for the management and visitors that their old and steadfast friend was present to occupy that interval.

A Failure at Dudley.

On the night of Sunday, the 26th ult., Dudley was suddenly thrown into darkness, owing to some mishap at the electric light station. The large arc lamps capitulated without a flicker of protest; and the small lamps in the middle of the posts shed a glimmering ray, which served only to indicate the darkness all around. At those licensed houses where electricity is the only illuminant employed, a very quaint position was brought about. All the light that could be produced was obtained from candles stuck in bottles.

Large Increase in Supply at Liverpool.

The report of the City Electrical Engineer of Liverpool (Mr. A. B. Holmes, M.Inst.C.E.) states that the output during 1901 amounted to more than 20 million units—exceeding, he believes, that of any other electrical undertaking in the United Kingdom. In 1898, the output was under 3 million units; so that the development has been very rapid. It should, however, be mentioned that the tramways are largely responsible for these big figures, seeing that in 1898 they took practically none of the current, while in the past twelve months close upon 14 million units have been required by them. In considering the most advantageous system to adopt for the outlying districts, Mr. Holmes has given special attention to recent developments in the generation and distribution of electrical energy. He is of opinion that the time may be approaching when fuel in its present form will cease to be brought into such cities as Liverpool; and that the energy contained in fuel will be brought from the colliery to the city either in the form of a cheap gas or of electricity at high pressure. As to the gas-engines worked from such a supply, they would double the useful work contained in a given weight of coal used for steam-engines; but against this possible saving, he remarks, must be put the cost incidental to the manufacture of gas and of its transmission from the colliery, while gas-engines still remain of comparatively small sizes. The transmission of energy from the colliery to the city by high-tension electricity is, Mr. Holmes thinks, probably a more promising plan for such distances as have to be dealt with in Lancashire; but for this method of transmission there are also many practical difficulties to be overcome. The existing power stations will, however, meet the requirements of the city for the next two years, during which time much experience will be gained in this country as to the transmission of power over long distances; and it is not necessary to decide at the present moment whether the future power stations for Liverpool should be constructed in the city or away at the colliery.

Extensions at Manchester.

At the Manchester Town Hall last Thursday, Mr. H. H. Law held an inquiry into an application made to the Local Government Board by the Corporation for permission to borrow £477,000 for extensions connected with their electricity supply undertaking. The Deputy Town Clerk (Mr. T. Hudson), who took charge of the proceedings on behalf of the Corporation, described the extent of the undertaking, and then dealt with the application in sections. He said the first part of it was concerned with the completion of a scheme laid before Mr. Boulnois at a similar inquiry held in 1901. This was the scheme of Dr. Kennedy for the construction of plant to give 15,000-horse power at Stuart Street; and the amount now required was £82,000. At the investigation held by Mr. Boulnois, five only of the ten sub-stations were dealt with. The present inquiry was concerned with the remaining five, and with additional matters. The second part was to deal with a proposed new installation at Stuart Street, which had been designed by Mr. Metzger. This would provide an additional 12,000-horse power, and cost £350,000. The third part of the inquiry related to the Dickinson Street low-tension station, where it was proposed to replace four small belt-driven sets by two new turbo generator sets. The new sets would provide 6000-horse power, as against 1600-horse power furnished by the four old ones. The estimated cost of these new sets was £43,861. Existing machinery had cost £13,861; and the Corporation proposed to deduct that, and borrow the balance—viz., £30,000. The remaining item to be submitted was a sum of £15,000 for additional mains to be carried between Ashton Old Road and the Corporation transforming station at Denton. To show the necessity for the proposed additional outlay, Mr. Hudson submitted figures relating to the whole equipment of the undertaking, and said the Corporation were unanimously in favour of the application. The Chairman of the Electricity Committee gave some particulars in regard to the growth in the number of consumers—stating that there were 1981 in 1898 and 3980 now; the names of 170 applicants who were waiting for connections were on the books. To meet the present and the prospective demand the Committee considered these extensions absolutely imperative. Dr. Kennedy, Mr. Metzger, and other witnesses, having furnished additional details of the various schemes, the inquiry closed. The Inspector afterwards visited the Corporation power station and other works under the control of the Electricity Committee.

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Affairs at Bath.

The Bath City Council sat for two hours last Friday, as an Electric Lighting Committee, considering the report of the Inquiry Committee as to the past conduct of the undertaking. In this report, the Committee severely criticize the management of the works by the Committee which has been superseded. The first cause of the accidents which had occurred was the defective system adopted by the old Company, and perpetuated under the Corporation's management. They find, further, that the whole of the high-tension mains laid up to the end of February, 1901, are of an obsolete type; the value of the concentric cables having been fully established for many years previous to this date. The switch-boards are bad in design, and should have been replaced some time ago. The Committee say that the failures were not a necessary incident of electric light production, and might have been avoided. Mr. Manville, who was called in to give expert advice, recommends the Council to reconstruct the works at a cost of £70,000, which would supply 23,800 more 8-candle power lamps. He estimates a total income of £18,370. The working expenses would be £8125, leaving a gross profit of £10,245. The interest and repayments on the present loans (amounting to £95,000) is £5732 annually; and on the prospective loan of £70,000 it would be £4200—leaving a net profit of £312. This would only be when the extra 23,800 lamps were connected. Mr. Manville advises the Council that a further profit might be made if they undertook to supply current to the Tramway Company, to do which an additional capital outlay of £6000 would be necessary. The ex-Mayor, who proposed the adoption of the Inquiry Committee's report (which included Mr. Manville's), claimed that there was nothing recriminatory about it, and said the Committee never set about their task with the object of making a scapegoat of anybody, but rather of finding from the experience of the past profit for the future. They had that morning received a supplemental report from Mr. Manville, advising an expenditure of £10,000 to tide the works over the next winter, as it was impossible to carry out any reconstruction scheme by that time. Except for £750, all of this would be part of the £70,000 he advised should be spent. Mr. Moger showed that the result of last year's working was a deficit of £800; but it would have been £2400 except for the exorbitant figure paid from the rates for the street lighting—£30 per lamp, as against £20 in some towns. Several members of the old Electric Lighting Committee warmly defended their actions; claiming that they were always guided, as they could only be, by the experts whom they consulted with the Council's consent. Generally, it was urged that the members of the old Committee ought to be allowed to make a full report in reply to the severe criticisms passed upon them. The debate was adjourned till to-day (Tuesday morning); no resolutions having been passed.

Gas v. Electricity at Redhill.

A wordy warfare on the above subject, to which reference has already been made in the "JOURNAL," has been going on in the columns of the "Surrey Mirror;" the principal combatants being Mr. Douglas Helps, the Engineer and Manager of the Redhill Gas Company, and Mr. E. Harcourt Burrage, the Chairman of the Electric Lighting Committee of the Corporation. Our readers are aware that the supply of electric current has been started; and as the venture is a public one, the residents are being strongly urged to support it by adopting the new illuminant. At the same time, the Corporation seem, curiously enough, to be chary of employing it themselves for the public lighting, inasmuch as they have only put up three arc lamps, and have had all the ordinary lamps altered to the incandescent gas system. The point for the consumers, however, is which light is the cheaper for their purposes; and this was naturally the salient feature of the correspondence. It is, of course, the business of the canvasser for electric lighting to put his figure as low as possible; and he generally succeeds in securing orders by making some indefinite promise that the cost will be "about the same as gas." But the consumer too frequently finds to his cost that such promises are delusive.

A case of this kind has arisen at Redhill. A consumer's gas bill for the June to September quarter, in 1900, came to £3 2s. 4d., whereas his electric lighting bill for the corresponding quarter of last year was within a penny of £8 12s.; and he had, in addition, to burn gas which cost him £2 10s. 5d. When his bill came in it, was a staggerer; for he appears to have been told that though the cost would at first be "only a trifle more than the gas," it would eventually come down to a level with it. He accordingly remonstrated, and went so far as to declare that the whole thing had been misrepresented. All the explanation he received, however, was that the charge was "moderate," and that he could reduce his lighting expenses by adopting 16 and 8 candle, instead of 32 and 16 candle, lamps, and by taking care to switch off the current when it was not required. This was about equivalent to telling a gas consumer that if he had only four burners instead of eight, and kept them going for half the former number of hours, his gas bill would be considerably less. Not content with this piece of Solomonic advice, the consumer was assured that, light for light, electricity was "incontrovertibly cheaper than gas," and that, in fact, gas was "dear at any price." This random statement did not convince the consumer. He had his electric light fittings taken out, and some incandescent gas-burners put in; and he declares that two of these give a far superior light to three of the 16-candle electric lamps, at a very much less cost. He accordingly offered to pay half the amount of the account rendered to him. If the experience of many of the other consumers is similar to the foregoing, Mr. Helps need not spend his time in newspaper correspondence. The advantages of gas will be manifest without any assistance.

The Troubles of Worksop.

Worksop is the proud possessor of a municipal electric light installation—and yet the ratepayers are not happy. From a letter which appears in one of the local papers, it seems that some people have been induced to become consumers by being told that electric lighting at 6d. per unit (the price charged) was as cheap as gas. At the end of three months' working, however, it has been found that "each consumer has burnt a ruination quantity." The writer goes on to say that

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"the consumers used the new light on a well-defined understanding that it would be impossible for the electric light to be dearer than gas; for, said the Lighting Committee's agents, 3s. 6d. worth of electric light would quite balance 3s. 6d. worth of gas. But it is very much the other way about, and 3s. 6d. worth of gas is equal to 7s. worth of the new light." Under these circumstances, it is hardly surprising to learn that some of the consumers have already ceased to take the current; "while the storm of indignation raised reached even the ears of the obtuse Lighting Committee." Turning to the proceedings at the last meeting of the District Council, we find that serious discontent was shown at the condition of affairs. Mr. White stated that many tradesmen who had been using electricity were cutting it off and reverting to gas; and they would never make it a paying concern if they got people to subscribe for three months and then throw it overboard. It was not likely anyone would pay £8, £9, or £10 a quarter for the electric light when their gas bills were only 30s. or 35s. Some of the shopkeepers had certainly a better light than formerly, but not one warranting an increase of 300, 400, and even 500 per cent. in some instances, over the price of gas. He moved that the price be reduced to 4d. per unit. Mr. Clark remarked that he would not say they had been intentionally misled; but it seemed to him the experts had calculated on theory instead of practice. He remembered very distinctly that "in their first discussion, when Mr. Mountain came down, they were told that 5d. per unit was equal to gas at 3s. 6d. This might be right in theory; but in practice it was not so. Many people had more light than they previously had with gas; but, taking all this into consideration, electricity was very much dearer than gas at the rate specified." A memorial was then presented signed by nearly fifty tradesmen, who expressed the opinion that the present price of 6d. per unit was excessive. After this, Mr. Law said Mr. White had moved that the price be reduced to 4d. per unit; but he would like it to be 3d., which was equal to gas at 3s. 11d. per 1000 cubic feet. He said at 4d. it was equal to gas at 5s. 3d.; but seeing that many consumers were willing to pay a little more than for gas, he would second the proposition that the price be 4d., with the usual discount of 5 per cent. on payment within fourteen days. Mr. Storer said he thought that to reduce the price to 4d. was too great a fall. They might have erred in charging 6d., and tradespeople might have erred in burning more than was necessary. No doubt the Gas Company would be called to account for their bills this quarter—for there had been a sort of competition between gas and electric light consumers; and the consequence was that the Gas Company would receive more money than hitherto. He had it on the best authority that they had made more gas this quarter than ever before. He thought that to reduce the price to 5d. was as great a concession as they could make. If it was a success, they could make a further reduction much better than they could raise it again. He would move that the price be 5d. Eventually, it was decided to refer the matter for further consideration in committee before coming to a definite decision. The undertaking was several times disrespectfully referred to as a "white elephant"—perhaps on account of the large appetite it promises to have for the ratepayers' money.

RIVAL WATER SCHEMES IN KENT.

As briefly mentioned last week, Colonel W. R. Slacke, on behalf of the Local Government Board, has recently held an inquiry at Harrietsham into the application of the Hollingbourne District Council for a loan of £10,000 for the purpose of providing a water supply for the villages of Leeds, Hollingbourne, Harrietsham, and Lenham, in Kent. Special interest was aroused by the inquiry, owing to the fact that the Mid-Kent Water Company have a rival scheme for supplying the places named, which they contended would be cheaper.

The case for the Council was stated by Mr. Harper, who referred to previous suggestions with regard to the Mid-Kent Water Company coming to the district; but on two occasions the Local Authority gave notice of opposition in Parliament, and the Company withdrew their proposals. At the present time at Hollingbourne water was obtained from streams running out of the chalk hills; people going to a dip-hole just before the stream crossed the road. The water was very liable to contamination. At Harrietsham, the local supply was on the opposite side of the road to the houses; persons dipping in a hole in the stream as it ran along. At Upper Street, Leeds, the supply was obtained from wells; but there were numerous cesspools in close proximity. Lenham had no proper supply; it had wells, and its drainage was defective. Mr. E. K. Burstal, M.Inst.C.E., estimated the cost of the proposed scheme at £8483. It was intended to sink a well at Harrietsham, near the base of the chalk hills, and about half-a-mile north-west of the railway station. They had already sunk a well between 50 and 60 feet deep, to prove that water was obtainable. Water was reached at 57 feet from the surface. The quantity was not tested; but there was no doubt as to this in a chalk district. It was proposed to raise the water to a reservoir the level of which at the top would be 628 feet above ground. The reservoir would have a capacity of 100,000 gallons. Pumping would be by an oil-engine of 16 nominal horse power. The requirements might amount to 50,000 or 60,000 gallons per day, calculating 12 gallons per head per day for about 5000 people. There was room for a second reservoir; and there was also accommodation in the engine-house for another engine, if it should be needed. There was undoubtedly a great volume of water obtainable in the neighbourhood. It was anticipated that 621 houses would take the water at once; and he estimated that the revenue would come to £1 per annum per house supplied. Pumping and maintenance charges would amount to about £150 a year. The Inspector said that, before granting the loan, the Board would require to be satisfied that the gathering ground was capable of providing a sufficient supply; and the water would also be analyzed at the termination of the experimental pumping. Mr. T. Powell, the Chairman of the Hollingbourne Rural District Council, said a supply was urgently needed. They had twice opposed the schemes of the Mid-Kent Water Company. They had no guarantee that the Company's supply would be adequate; and they did not think any company could give such a guarantee. The Council considered they were in a position to furnish water at a cheaper rate than the Company.

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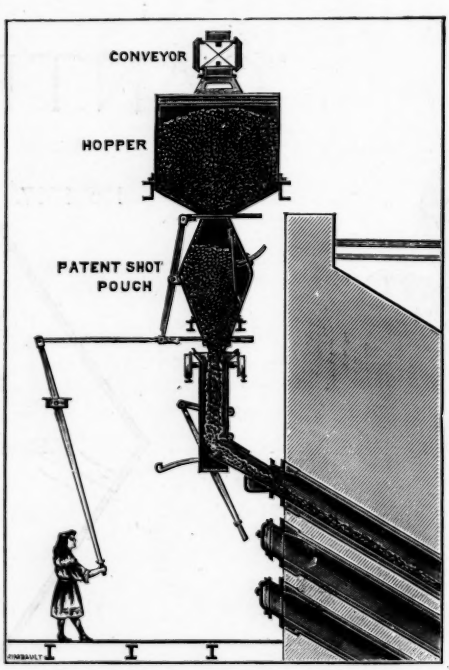

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They were bound to have water; and if the Local Government Board did not sanction this scheme, they would try some other way.

The first witness called on behalf of the rival scheme was Mr. F. L. Ball, the Secretary of the Mid-Kent Water Company. He said it was intended to supply the district in question from Charing; and a Provisional Order was now before the Board of Trade for the purpose. The Company owned land at Charing. There was an 8½-inch bore there into the lower greensand; the total depth being 598 feet. A small pump in the boring gave 3100 gallons per hour; but the Company were advised that they could obtain at least 9000 gallons per hour from it. A reservoir of 250,000 gallons capacity was being built; the mains for the supply of Charing were being laid; and the pumping machinery for 9000 gallons an hour was ordered and promised for delivery by the end of February. The Company's chief source of supply was at Halling, near Rochester, where there were two borings into the greensand; and the reservoir, which was at Mereworth, had a capacity of 350,000 gallons. A small part of Lenham was now being supplied with the Halling water. The Company had pumped 65,000 gallons an hour at Halling; and they systematically pumped 1,000,000 gallons a day, without perceptibly affecting the supply—the water-level being the same to-day as it was ten years ago. By arrangement with the Maidstone District Council, the Company's pipes were being extended to Linton; the supply coming direct from Halling. Linton was about 2½ miles from Leeds, one of the four parishes in question. No inquiry had yet been held into the Company's application to the Board of Trade to supply these four parishes, and also Broomfield. The mains proposed to be laid would be 12½ miles long. The water would first come from Charing; and the Company hoped to join up to the Halling mains, so that there should be a supply from both ends of the district. The pipes would supply 121 more houses than the Council's scheme. The Company were supplying 39 villages; and the average annual amount received by them for each house supplied was 17s. 5d., including trade purposes. He thought 80 per cent. of the houses would be as many as would take the water for many years; and this would mean an income of £3050. He did not agree with Mr. Burstal's estimate of expenditure. Assuming the Council's scheme was carried out, the expenditure would have to include £65 a year for a man, £192 for oil only, £10 for lubricating oil and packing for the pumps, £10 for repairs and renewals of the engine, £25 for the upkeep of buildings and mains, £10 for clerical work, £25 rates and taxes, £5 for analysis, and £500 interest and repayment of the proposed loan. This meant that there would be an annual loss of £537, which would necessitate a 7d. rate per annum over and above a charge for the water at the same price as the Company's. Mr. Burstal (interposing) remarked that the difference between them was entirely on the question of oil. Mr. Ball (continuing) said the Company proposed to supply the parishes at the rate authorized by their Acts. The Directors would consent to the insertion in the Provisional Order of a clause to complete the scheme within twelve months from the date of the Order; and they would agree to a penalty of £1 a day for every day after this period that the work was not finished. The Company could do the work remuneratively, because the only expenses would be the laying of the mains and a very small cost for pumping. The mains would cost between £4000 and £5000, which would be raised at 4 per cent. without any difficulty. The motive power of the pumping machinery at Charing was to be gas. With regard to oil, he had quotations from some of the largest firms; and the price was 8d. per gallon. Mr. Burstal replied that he had been working on an advertisement which put the price much lower than 8d.

A considerable amount of influential local support having been given to the Company's scheme, the Counsel engaged addressed the Inspector, and the inquiry terminated.

SEVENOAKS WATER-WORKS.

Negotiations for Purchase by the Council.

At the last Meeting of the Sevenoaks Urban District Council, a report was presented by a Sub-Committee with regard to negotiations that had taken place in reference to the purchase of the Water Company's undertaking. The Directors last October expressed their willingness to accept £146,000 for the works; but as this meant more than 50 years' purchase of last year's net revenue, the Council could not entertain the offer. Thereupon a Sub-Committee was appointed to meet the Directors and talk over the matter. A conference took place in due course, when the Council's views were frankly stated. The Sub-Committee dwelt specially on the Arbitrator's award in the case of the purchase of the Hemel Hempstead Water-Works last April. This award was equal to from 30 to 34 years' purchase of the profit for 1899; and the two cases were so similar, that the Sub-Committee thought that the principle which guided the Umpire in the Hemel Hempstead arbitration might be applied in the purchase by amicable agreement of the Sevenoaks Water-Works. Accordingly, it was represented to the Directors that 30 years' purchase of their last year's revenue or profit was the fair market value of the undertaking—assuming that it was in good, up-to-date working order, as were the Hemel Hempstead works. The price named by the Sub-Committee therefore was £78,270. The Directors, having considered the matter, replied that the circumstances of the Hemel Hempstead case and their own were so different that a comparison could hardly be made; and they regretted their inability to recommend the shareholders to accept the Council's offer. The Sub-Committee explained that their figure of £78,270 was based on the Company's balance-sheet for the half year ending June 30, 1901; and it was pointed out at the conference that it would be fairer to have an offer upon the net profit for the whole year—a suggestion which the Sub-Committee deemed reasonable. In so calculating, they arrived at £86,610 as the price for 30 years' purchase of the net profits of the last year. The Sub-Committee were inclined to recommend the Council to make a formal and final offer of the last-named sum, without prejudice, and provided that the works as a going

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concern were absolutely perfect. Such an offer, if made and accepted, would enable the Directors to pay off all their loan and share capital, with a premium on the latter of 50 per cent., and would leave in their hands the handsome balance of £26,310 for back-dividends, expenses of liquidation, solatium to Directors, and compensation to officials. Dr. Marriott moved that the Sub-Committee be empowered to write to the Company making an offer in accordance with the report. This was agreed to; and the report was then adopted.

Faversham Public Lighting.—The Faversham Town Council have received notice from the Gas Company to terminate the existing contract for public lighting on June 30 next; the Directors stating that at £3 10s. per lamp they are undertaking the work at a loss.

Metropolitan Gas Company of Melbourne.—The profits of this Company for the past six months were £56,000. A dividend of 4s. 6d. per share has been declared for the half year, £20,000 has been added to the reserve fund, and a balance of £11,800 carried forward.

Gas Profits at Cirencester.—The following figures with regard to the Cirencester Gas Company have been made public: Total receipts, £9018; expenditure, £6397 (as against £8059 and £5796 respectively for the previous year); balance, £2261; capital, &c., paid up, £24,305; loan capital, &c., issued, £5600; coal carbonized, 3939 tons; and make of gas, 37,670,000 cubic feet. The dividends paid are 9½ per cent. on £12,000, 4¾ per cent. on £5000, and 6¾ per cent. on £5400.

Leeds Gas-Workers Dispute.—The promise of the Leeds Gas Committee to allow "a minimum of six shifts a week as far as possible," has not been accepted by the men. At a meeting of the Gas Workers' Union held last week, it was decided, having regard to the fact that the men had given way upon every other point at issue, not to agree to the terms of settlement proposed by the Committee. The general feeling was that the somewhat elastic condition attached to the offer would lead to endless difficulties, and that a more definite system should be arranged. The officers of the Union were requested to communicate this decision to the Committee.

Coal-Testing Plant at the Manchester Gas-Works.—At last Friday's meeting of the Manchester Corporation Gas Committee, it was reported that the experimental apparatus for testing coal sent on contract or in connection with tenders had been completed, and was in operation at the Bradford Road Station. The apparatus is a miniature gas-works, thoroughly up to date in every detail, and sufficiently large to serve a fair-sized village. As the Committee expend upwards of £350,000 a year in coal and cannel, the importance of a constant test, with accompanying records, is apparent as a means of ascertaining whence comes the most profitable material. The gas made is used with the ordinary supply from Bradford Road. The capacity of the plant is reckoned at 100,000 cubic feet of gas daily; and it will carbonize 5 tons of coal in 24 hours. The erection of the miniature works has been carried out under the supervision of Mr. J. G. Newbigging, the Gas Engineer to the Corporation.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Monday's meeting of the Edinburgh and Leith Gas Commission was a somewhat unimportant one. The Convener of the Works Committee (Mr. D. Purves) reported, with pleasure, that the consumption of gas during December was greater than in the corresponding month of 1900 by over 19 million cubic feet, which was a very satisfactory increase indeed. The Commissioners have now on hire nearly 6000 gas cookers and stoves. They have now got over the principal load for the year; and everything is doing well with them. They are pushing on with the new gas-works at Granton, and hope to have them under way very soon. In connection with this report, it is interesting to notice that the increased consumption of gas during the period from May 16 is only 35 million cubic feet, so that the increase in December was more than what it was in the six months preceding. This, I surmise, is due to the exceptionally good weather which was experienced during the summer and autumn of last year. In fact, the weather only broke down about the middle of November. It has been much colder and more cloudy since, and naturally more gas has been required for both lighting and heating.

The Works Committee reported that the Commissioners had been served with a summons at the instance of Messrs. George Wigmore and Co., builders and bricklayers, of Glasgow and Edinburgh, with the consent and concurrence of George Parker, Writer, of Glasgow, and the said George Parker for his own right and interest; and that the Granton Works Sub-Committee had been empowered to attend to the Commissioners' interests. Messrs. Wigmore were Contractors for the erection of a portion of the buildings at Granton; and their claim is for extras and the like. The amount of it is £1215. The action has been brought before Lord Low in the Court of Session.

A letter was submitted from the two Joint Conveners of a Committee appointed by the last General Assembly of the Church of Scotland upon the question of Sunday labour. They desired to approach representative persons in different industries with a view to obtaining as much information as possible, and the Commission had been recommended to them as a body who would be able to give valuable assistance. The Committee would esteem it a great favour if the Commission would give them their experience: (1) As to what extent Sunday labour went on in their particular branch of industry; (2) the amount of work done; (3) how far the Commissioners considered it unnecessary, and how far necessary and unavoidable; (4) whether they thought the work might be so arranged as to reduce or minimize labour on Sundays; (5) approximately the number of men employed on Sundays, as compared with other days; (6) the number liable to work on Sundays; and (7) whether the men have, during the week, any corresponding period of rest. Any information received, it was added, would be considered as absolutely private and confidential. The Chairman of the meeting (Provost Mackie) said he was sure they

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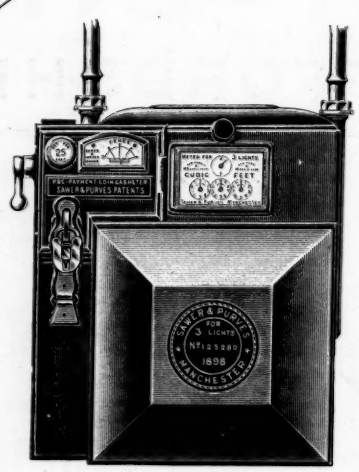

MANCHESTER.

would have no objection to answer the questions. It was their policy to minimize Sunday labour as much as they possibly could. He thought Mr. Herring should be authorized to draw up answers, and submit them to the Works Committee, with a view to their being forwarded. This was agreed to. It will be observed that the Commission are approached as representative persons, and that the information asked is not with reference to their own establishment, but to their particular branch of industry. While that is so, of course Mr. Herring will not be able to give information as to what goes on in other undertakings; but some of the questions are of such a nature that he might venture upon answering them in a general way, as a sort of expert witness. I think that is what the Committee of the General Assembly desire.

Mr. W. Foulis, the Engineer to the Glasgow Corporation Gas Committee, is looking ahead, so far as the new gas-works at Provan are concerned. He is anticipating the finishing of the first section, and the delivery of gas from them; and he has accordingly prepared plans of the proposed route for conveying the gas by the pipes or mains to the eastern and north-western districts of the city. The plan which Mr. Foulis has submitted to the Works Sub-Committee has been considered and approved by them; and it has been agreed to recommend that it be remitted to a Special Sub-Committee along with the Engineer and the Law Agent, with powers to negotiate with the proprietors of ground which it may be advisable to take as parts of the route.

The right or expediency of corporate bodies to elect other than members of their own body to represent them upon public boards or trusts, formed the subject of discussion at a meeting of the Edinburgh Town Council this week. The Councils of Edinburgh and Leith appoint the members of the Gas Commission and the Water Trust. It is not always found convenient or desirable that a man should cease to be upon those Boards when he leaves the Council; and there are always a few members of both bodies who are not, at the time, councillors. It was with a view to securing that office in such bodies should only be held while the holders continue in the Council, that Mr. Murray brought the subject forward. The cry of direct representation was raised. Against that, in a country which is governed by elected representatives, nothing can be said in the abstract; but, in practice, it would be a mistake if town councils should not have the power to avail themselves of the services of men who may be specially fitted for the work. There was an instance the other week which gives point to this remark, when, the Town Council of Leith having refused to return ex-Bailie Archibald to the Water Trust, room was made for him in the Trust by an Edinburgh councillor retiring from it. Mr. Archibald has nursed the Talla extension scheme from its infancy, and knows its details most thoroughly. It would have been a blunder to have dispensed with his services, so long as they were available. The Council acted wisely in rejecting Mr. Murray's proposal by 30 votess to 11.

The good sense of having Mr. Archibald on the Water Trust is shown by the vigour with which he is pushing forward the Talla extension scheme. On Thursday, he presided at a meeting of the Works Committee of the Trust, who spent four hours in considering the report by Mr. G. H. Hill, to which I referred last week. As the outcome of their deliberations, the Committee adopted a resolution to the effect that it is inexpedient to proceed with the construction of filters at Fairmilehead, for the new supply, as the water may be filtered at the present station at Alnwick hill at little cost. The Committee also appointed three Sub-Committees who will visit the works in relays, at periods not exceeding one month.

On Monday, the Town Council of Perth considered, in Committee, the report by Mr. M'Lusky as to the necessity for immediately extending the new gas-works. By a majority, they resolved to sanction Mr. M'Lusky's proposals, which involve an expenditure of about £6000.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 1.

Sulphate of Ammonia.

Demand is still well sustained; and a farther improvement in values has to be noted, the closing quotations being £11 7s. 6d. per ton f.o.b. Hull, and £11 8s. 9d. to £11 10s. per ton f.o.b. Leith and Liverpool. Consumers have been more in evidence in the market, and there has been more direct business than was the case earlier in the month; the firmness of the nitrate of soda market and the relative cheapness of sulphate of ammonia being no doubt the determining cause. There has also been considerable buying for February delivery at current prompt prices. For delivery over the spring months, buyers are still trying to get in at below makers' prices; and to a certain extent they have been able to buy from speculators. But makers remain firm at their quotation of £11 10s. per ton, London, Beckton terms, and f.o.b. Leith, ordinary terms.

Nitrate of Soda.

This is very firm in all positions, and the spot price for fine quality remains 10s. 3d. per cwt.

LONDON, *Feb.* 1.

Tar Products.

The markets generally remain in about the same position. Pitch is very firm indeed; and there is a strong inquiry for London, while contracts are reported to have been made in the North for delivery up to the end of June, 1903, but, of course, at lower prices than those at present ruling. 90 per cent. benzol is decidedly dull. A large contract is reported to have been made in the North, for February-June, at the equivalent of 10d. Consumers do not take any interest in 50-90 per cent. at present; but an offer of 8d. made for a considerable quantity was declined by distillers. Creosote is scarcely so firm in the Lancashire and Yorkshire districts. There is evidently more offering; and prices may be taken as a little easier all round. Carbolic is very quiet. A little business has been done in 60's at 1s. 10d. for export; but consumers, as a rule, do not care to purchase for forward delivery. In crystals, 39-40's are very dull; the French contract having been

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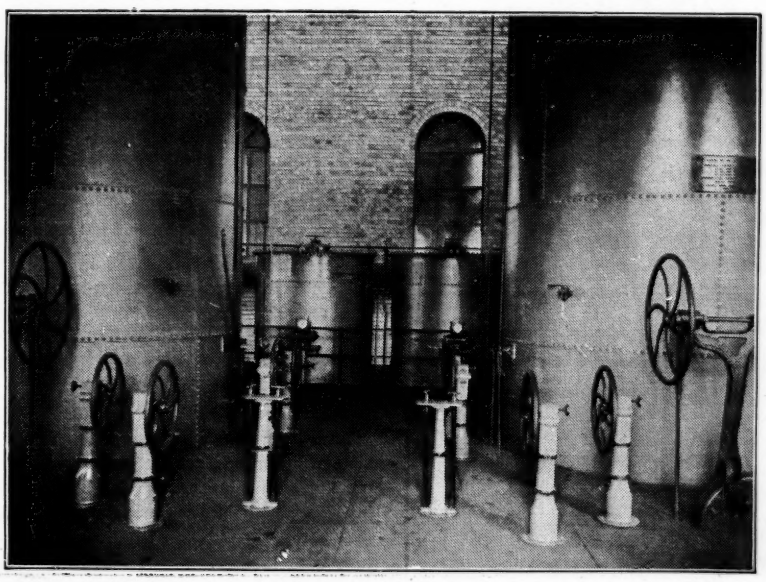

RESULTS PROVE EFFICIENCY.

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taken at a very low price indeed. In 34-35's there is nothing fresh to report. Tar prices are rather firmer, doubtless on account of the increased value of pitch.

The average values obtaining during the week are: Tar, 16s. to 19s. Pitch, east coast, 36s. 6d. to 37s. 6d.; London, 38s. 6d. to 39s.; west coast, 34s. 6d. to 35s. Benzol, 90's, 10d.; 50's, 8½d. Toluol, 9d. to 10d. Crude naphtha, 4d. Solvent naphtha, 11d. Heavy naphtha, 10d. Creosote, North, 1d. to 1⅛d.; London, 1⅝d. to 1⅞d. Heavy oils, 2 1/16d. to 2⅛d. Carbolic acid, 60's, 1s. 10d. Naphthalene, 50s. to 70s.; salts, 22s. 6d. to 37s. 6d. Anthracene, "A," 2d.; "B," 1d.

Sulphate of Ammonia.

The market is very firm. The position remains unchanged. Beckton has made several sales at £11 10s. for early delivery, but reports having very little to spare for February-March. For February-June, however, the price remains unchanged at £11 10s. In Hull, business has been done at £11 7s. 6d. for early shipment; and. as a rule, £11 10s. is now asked for February-June. In Leith, business is reported at £11 7s. 6d., and in some instances £11 8s. 9d., for prompt shipment; but consumers generally are asking £11 10s. for February-June. In Liverpool, the demand appears to have improved, especially for propmt shipment, for which there is a very good inquiry.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Winter requirements for house-fire consumption are still keeping up a steady tone in the coal trade of this district; and there has been no actually quoted alteration in prices with the commencement of the present month. Supplies, it is true, are becoming more plentiful; but pits, which are kept on full time, are still fairly moving away their output, and any stocks accumulating are mostly lying under load in waggons at the pit sidings. This is especially the case with regard to engine fuel, the commoner sorts of which are becoming more difficult to move; and prices for these are easier. There is still a holding back on the part of large users of coal from contracting for this year's supplies, as it is generally anticipated that prices before very long will have to give way; but until a slackening off in house-fire requirements and lessening demand for gas-making purposes tend to throw some surplus of round coal on the market, any appreciable giving way in prices can scarcely be looked forward to as probable. The better qualities of round coal, suitable for house-fire purposes, remain steady at 15s. to 15s. 6d. per ton at the pit for best Wigan Arley, 13s. to 13s. 6d. for Pemberton four-feet and seconds Arley, and 11s. to 11s. 6d. for common house coal. Steam and forge coals are also maintaining about late rates—averaging 9s. per ton at the pit for good ordinary qualities. The shipping demand for steam coal continues fairly active; but prices are not quite so strong—10s. 6d. to 11s. representing average figures for good descriptions, delivered at Mersey ports. The better qualities of engine fuel are generally meeting with a ready sale; but except for some special sorts, 7s. represents about the maximum price now obtainable. The commoner kinds of slack are hanging at a good many of the collieries; and for these 5s. to 5s. 6d. per ton upwards, according to quality, are average prices. Coke is steady at about late rates; averaging 13s. to 14s. per ton for best Lancashire-washed furnace cokes, and 22s. to 24s. for best foundry qualities at the ovens.

Northern Coal Trade.

There has been a larger demand shown in the coal trade during the last few days; but it has been unequal, and thus prices have not been affected so much as they otherwise would have been. Best Northumbrian steam coals are now nearly at the dullest period of the year, and the prices are weaker—from 10s. 6d. to 11s. per ton f.o.b.; while steam smalls are less plentiful at 5s. per ton. Some of the steam coal collieries have now to work short time, owing to the lack of orders. Coking coals are a little easier. In the gas coal trade, there is not so much change in the actual quotations; but the market is easier now for forward deliveries, though the prompt demand has been made larger through the continuance of keener weather. Prices are from about 10s. 3d. to 11s. per ton f.o.b. for occasional cargoes of Durham gas coals; while for forward supplies from 9s. 9d. to 10s. per ton f.o.b. is the current general quotation. In the coke trade also values are easier. Best Durham export coke is about 17s. 6d. per ton f.o.b., blast-furnace coke is 16s. to 16s. 6d. at the Teesside furnaces, and gas coke is obtainable at about 10s. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

The past week was a quiet one. Foreign orders are scarce; the coal tax difficulty not being yet out of the way. Prices have a tendency to droop; but they will have to come further down before trade can be looked upon as satisfactory. The prices are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 10s. 3d. to 11s., and splint 10s. 9d. to 11s. The shipments for the week amounted to 185,263 tons—a decrease of 452 tons upon the previous week, but an increase of 29,371 tons upon the corresponding week of last year. For the year to date, the total shipments have been 592,648 tons—an increase of 25,637 tons upon the same period of last year.

So Simple!

Simple Simon met a pieman
Going to the Fair,
Said Simple Simon to the pieman
"Let me taste your ware."

Said the pieman to Simple Simon:
"Show me first your penny;"
Said Simple Simon to the pieman:
"Indeed, I have not any."

SIMPLE SIMON lived before the days of Gas and the **"Eureka"** Cooker. We were first in the field, but we were too late for Simon. The loss was Simon's!

Simon was simple, but the **"Eureka"** is simpler still. With all his simplicity—and a **"Eureka"**—he could have baked his own pies, quite as good ones as the pieman's, and at half the money. He could have done it in less time than it took him to go to the Fair and beg them on the long-credit system from the historic pieman, who evidently preferred cultivating a cash trade only.

You can't get

COOKERS FOR NOTHING.

any more than Simon could get pies at the same low rate, but if you have an attack of Simon's complaint—viz., the want of ready money—there is a cure for your ailment (provided it isn't chronic)—you can have a **"Eureka"** on hire. That is where you have the pull over Simon. With him it was "No pay, no pie," and the hire system would work rather awkwardly in the pie trade!

The **"Eureka"** is the first in the market—first in time, and first in quality. It will do as much as any Cooker; do it better than many; and do it longer than most. It will make poor food palatable, and dear food delightful. It will broil without burning, roast without turning, fry without frizzling, and do the thousand and one needful things that only cooks and housewives know of, with little trouble, less cost, and no dirt or smell whatever.

Your Gas Company supplies The "EUREKA" for cash, or on hire. For rates see next page.

JOHN WRIGHT & CO.,
Essex Works, Aston,
BIRMINGHAM.

We shall be pleased to send you a quantity of LEAFLETS as above, upon hearing from you, with your Name and Address, &c., printed on.

The Institute of Sanitary Engineers has been re-registered with 100 members, each liable for the sum of £2 in the event of winding up.

The Glasgow Corporation Gas Department have accepted the offer of Jas. A. Millen, of the Tradeston Iron-Works, Glasgow, for the supply and erection of the steel roofs of the workshops, exhauster-house, and meter-house at the new gas-works at Provan.

The Cleethorpes Gas Company have placed an order with Messrs. R. Dempster and Sons, Limited, of Elland, for new coal-stores, railway-waggon weighbridge, coal and coke breakers, and complete coal and coke handling plant, for conveying the coal from the railway sidings into the stores and retort-house, and for loading coke into railway waggons from the yard.

The Newcastle and Gateshead Gas Company have placed a contract with West's Gas Improvement Company, Limited, for a complete installation of compressed-air stoking machinery for their No. 2 retort-house at their Redheugh Gas-Works. When complete, this will be the third large retort-house at these works fitted with West's stoking machinery. Compressed-air stoking-machinery is also in hand for the Genoa Gas-Works.

The business of gas plant manufacturers carried on at the Golds Green Foundry, West Bromwich, by Messrs. C. Akrill and Co., has been converted into a limited liability undertaking with a capital of £100,000.

The East Surrey Water Company recently invited tenders for 1400 shares of £10 each (7 per cent.), at the minimum price of £16. Applications were received for more than four times the number offered; and the average figure realized by the sale was £16 8s. per share, or at the rate of 64 per cent. premium on the nominal value. The Company are to be congratulated on having such testimony of the appreciation of investors of their stock as a high-class security.

The new year has opened very prosperously with the Economical Gas Apparatus Construction Company, Limited, makers of the Merrifield-Westcott-Pearson patent carburetted water-gas plant. After careful consideration, the Gravesend Gas Company have given them an order for a plant of 300,000 cubic feet daily capacity, with everything arranged for duplicating it at a future date. The owners of the gas undertaking at Pernambuco, Brazil, have also, after careful investigation, given the firm an order to supply them with a plant at once, likewise with provision for future extension.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in Advance. If credit is taken, the charge is 25s. a year.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, LONDON." Telephone: Holborn 121.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications *re* Oxide to the Company as above.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for use in GAS-WORKS.

ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street,
"Volcanism, London." London, E.C.

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.

For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

BROTHERTON & CO.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

PREPAYMENT METER WORK.

CONTRACTS are undertaken by William EDGAR for FITTING UP HOUSES complete with the PENNY-IN-THE-SLOT INSTALLATIONS. Gas Companies or Corporations indemnified against loss through Accidents, &c. Thousands of Houses have been fitted up by me under this System. Estimates free.

BLENHEIM HOUSE, 23, Lower Mall, HAMMERSMITH.
Telegrams: "GASOSO."
Telephone No. 14, Hammersmith.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., Ammonia Distillers. Works BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

PATENTS AND TRADE MARKS PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.

MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

SULPHURIC ACID for Sale.

BROTHERTON AND Co., Chemical Manufacturers, Works; BIRMINGHAM, LEEDS, and WAKEFIELD.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

OXIDE OF IRON.

EERSTE Hollandsche Yzererts Maaty. (The First Dutch Bog-Ore Company, Limited), ROTTERDAM.

PRINCIPAL AGENTS:
England—C. E. FRY, Tower Chambers, Brown St., MANCHESTER.
Scotland—J. B. MACDERMOTT, 11, Bothwell Street, GLASGOW.

PROVINCIAL Gas Companies may pro- fitably consider the advantages offered by ACETYLENE for the PUBLIC and PRIVATE LIGHTING of OUTLYING PORTIONS OF THEIR DISTRICTS, which do not at present justify the expense of laying Coal-Gas Mains from the Central Works.

Correspondence on this subject is invited by the ACETYLENE ILLUMINATING COMPANY, LIMITED, 3, Victoria Street, LONDON, S.W.

TO GAS AND WATER OFFICIALS.

HIGHEST-CLASS Cycles.—"Humbers," "Premiers," "Swifts," "Court Royals," "Centaurs," and all best makes on Special Terms to Gas and Water Officials.

Write precise Requirements to MANAGER, Imperial Cycle Supply Company, COVENTRY.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are pre- pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.

19, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "LUMINOSITY."

GAS TAR wanted.

BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.

For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."

Largest Practice and most Up-to-Date Works in Britain.

JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

WANTED, a Situation as Carburetted WATER-GAS MAKER. Five Years' Experience. Good References.

Address No. 3812, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a First-Class Fitter, who can undertake the Maintenance of Incandescent Burners and Mantles, &c.

Apply, stating Age, Experience, and Wages required, to G. HELPS, Gas-Works, NUNEATON.

COAL GAS TAR wanted.

State Quantity to offer for Prompt and Forward Delivery.

The SHARPNESS CHEMICAL COMPANY, Tar Distillers, Sharpness Docks, GLOS.

TO GAS AND WATER OFFICIALS.

HIGH CLASS CYCLES at lowest Prices guaranteed and sent on APPROVAL for Cash or GRADUAL PAYMENTS. Catalogue and Testimonials from Gas Managers post free.

MELROSE CYCLE COMPANY, COVENTRY.

GENTLEMAN, who is a good ACCOUNTANT and thoroughly understands SECRETARIAL duties and general work of Gas Office, possessing full knowledge of GAS STOVE and FIRE DEPARTMENT, seeks re-engagement.

Address No. 3800, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, a Gas Manager at the Athy Gas-Works. Must thoroughly understand his Business in all its Branches, and be a first-class Gas-Fitter. State Age and Reference.

Terms on application to the SECRETARY, Gas Company, ATHY.

WORKING Manager wanted for Gas-Works producing about 12 million cubic feet annually, near large Town (Midlands). Modern Plant. House, Gas, and Coal found.

Apply, by letter, stating previous Experience, Salary required, &c., to No. 3814, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-FITTER wanted by a Gas Company within 40 miles of London. Must be used to Stoves, Meters, Incandescent Lights, and Fittings and Soldering Work.

State Age, if Married or Single, and Wages required, sending *copies* only of Three recent Testimonials, to No. 3811, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS ENGINEER.

WANTED immediately an Engineer to take charge of a Municipal Gas Undertaking in a British Colony in the East. Age not to exceed thirty-five Years.

Must have had efficient technical training, and experience both of Manufacture, Testing, and Distribution.

Minimum Salary £500 per annum.

Written applications will be received until the 15th inst. by Messrs. CORBET WOODALL AND SON, Palace Chambers, LONDON, S.W.

SECRETARY and Manager wanted by the High Wycombe Gaslight and Coke Company, carbonizing about 5000 Tons of coal per annum. The successful Candidate will be required to devote the whole of his Services to the Company.

Applicants must have a thorough knowledge of the working of Regenerative Furnaces and all connected with the Manufacture and Distribution of Gas; be competent to keep the Accounts, and conduct the Secretarial work of the Company; and able to enter upon his duties by the 1st of March. Security will be required for £500. Salary £230 per annum. House, Gas, or Coal not found.

Applications, stating Age and Experience, accompanied by not more than Four recent Testimonials, to be addressed to the CHAIRMAN of the Gas Company, HIGH WYCOMBE.

WANTED, a Gasholder Erector.
Apply, by letter, stating Experience and Age, with recent Testimonials, to No. 3807, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, a smart, steady YOUNG MAN, with a knowledge of the Cleaning and Maintenance of Consumers' Incandescent Burners. Absolutely irreproachable character indispensable. Wages 22s. to 24s.
Apply, by letter, in the first instance, to the GENERAL MANAGER, Gas-Works, MILL HILL, N.W.

WANTED, by a large Suburban Gas Company, a Young Man of good address as SHOW-ROOM ASSISTANT. Previous experience indispensable, and good writing essential. Wages 20s. to 25s. to commence with, according to Age and Experience.
Apply, stating Age and Qualifications, to No. 3810, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-FITTINGS AND ACCESSORY BUSINESS.
WANTED, an energetic, capable MANAGER (say, about 30) for Gas-Fittings and Accessory Business in London. Three Travellers kept. Salary from £200 to £250.
Apply, in first instance, to the RICHMOND GAS STOVE AND METER COMPANY, LTD., 132, Queen Victoria Street, LONDON, E.C.

WANTED, a Second-hand Exhauster, to pass 5000 cubic feet per hour, with Bye-Pass Valves, &c. Complete and in good order; or STEAM-ENGINE and EXHAUSTER combined.
Address the MANAGER, Gas-Works, AUCHTERARDER.

BUYER is open to give good Price for surplus TAR from small Gas-Works using Cast-Iron Retorts.
Address G. H. BUDD, 6, Lawrence Road, UPTON MANOR, E.

GAS-WORKS FOR SALE OR TO BE LET.
THE Directors of the Langport Gas Company, Limited, are prepared to receive APPLICATIONS for the PURCHASE or RENTING of the LANGPORT GAS-WORKS as from the 30th of June next, when the present 21 Years' Lease will terminate.
Sealed Tenders to be sent to the undersigned (from whom further Particulars may be obtained) on or before the 10th of February next.
The Directors do not bind themselves to accept the highest or any Tender.
W. J. BLAKE,
Secretary of the Company.
Langport, Somerset,
Jan. 13, 1902.

FOR SALE—The English Patent for an Electric Gas-Lighter, or Capital wanted to develop same.
Apply, by letter, to No. 3804, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

TO BE SOLD—
GASHOLDER (and Cast-Iron Tank), 17,500 cubic feet capacity.
CENTRE-VALVE, 15 in. diameter, by Walker, for Four Purifiers.
Four PURIFIERS, 10 feet square, in line, with Planed Joints, Walker Centre-Valve, Covers, and Traversing Crab Lifting Gear. Will be refixed equal to new.
Write J. WRIGHT, Bridge House, BLACKFRIARS, E.C.

TO GAS COMPANIES.
GAS Plant wanted—
Good 6-inch and 8-inch FOUR-WAY VALVES for Purifiers.
Also 40 feet diameter GASHOLDER and OTHER PLANT.
J. FIRTH BLAKELEY & Co., DEWSBURY. We have a large Stock of good APPARATUS and solicit Inquiries for either NEW or SECOND-HAND.

TO SELL—
PURIFIERS, 6, 8, 10, 12, and 20 ft. square.
SCRUBBERS, 3 ft. to 7 ft. diameter.
WASHER-SCRUBBERS, Holmes' and Clapham's makes.
CONDENSERS, up to 16-in. Connections.
GASHOLDERS, up to 50 ft. diameter.
EXHAUSTERS, up to 60,000 cubic feet per hour.
METERS, GOVERNORS, VALVES, and all REQUISITES.
Address: J. FIRTH BLAKELEY & Co., DEWSBURY.

FOR SALE, Cheap, and in Excellent Condition—
Two Lengths Wrought-Iron HYDRAULIC MAIN—viz., 9 ft. 6 in. by 18 in. by 18 in., ⊃, with 5-inch Dips, Arch Pipes, and Valves; 8 ft. 10 in. by 15 in. by 15 in. ⊃, with 5-inch Dips, Arch-Pipes, and Valves.
Four 21 in. by 15 in. OVAL SELF-SEALING MOUTHPIECES, Sockets 8 inches Internal Diameter.
Ten 21 in. by 14 in. ⌂ MOUTHPIECES, with Wrought-Iron Luted Lids, Sockets 8 inches Internal Diameter.
Six Heavy Cast-Iron BUCKSTAYS.
The above may be seen, or further Particulars obtained, on application to J. H. CORNISH, Gas-Works, Bridport, DORSET.

FOR SALE—Two Purifiers, 6 ft. square by 3 ft. deep, with 6-inch Connections and Centre Valve to work Four Purifiers. In good condition; Covers equal to new. Can be seen by appointment.
Address No. 3813, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GASHOLDER BUILDERS, &c.
THE Gas Committee to the Todmorden Corporation are prepared to receive TENDERS for the STRIPPING and RE-SHEETING of one 80-feet TELESCOPE DOUBLE-LIFT GASHOLDER.
Full Particulars and Form of Tender can be obtained on application to the Engineer and Manager, Mr. Henry Hawkins.
Tenders, endorsed "Gasholder," to be delivered at the Town Clerk's Office, Town Hall, Todmorden, addressed to the Chairman of the Gas Committee, on or before the 17th inst.
The Committee do not bind themselves to accept the lowest or any tender.
By Order,
HENRY HAWKINS,
Engineer.

RETORT AND FIRE-BRICK MANUFACTURERS, &c.
THE Gas Committee to the Todmorden Corporation are prepared to receive TENDERS for the supply of the necessary RETORTS, FIRE-BRICKS, &c., also RETORT SETTING required for the current Year.
Full Particulars and Form of Tender can be had on application to the Engineer and Manager, Mr. H. Hawkins.
Tenders, endorsed "Retorts, &c.," to be delivered at the Town Clerk's Office, Town Hall, Todmorden, addressed to the Chairman of the Gas Committee, on or before the 17th inst.
The Committee do not bind themselves to accept the lowest or any Tender, but reserve to themselves the right to accept a portion of any Tender.
By order,
HENRY HAWKINS,
Engineer.

CORPORATION OF DARLINGTON.
(GAS-WORKS DEPARTMENT.)
TENDERS FOR TAR AND AMMONIACAL LIQUOR.
THE Gas-Works Committee of the above Corporation invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR to be produced at their Works during the Twelve Months ending the 31st of December, 1902.
Futher Particulars and Form of Tender may be obtained from Mr. Frank P. Tarratt, Gas-Works Engineer, Darlington.
Tenders, endorsed "Tenders for Residual Products," addressed to the Chairman of the Gas-Works Committee, to be sent to the Town Hall, Darlington, not later than Saturday, Feb. 8, 1902.
No pledge is given that the highest or any Tender will be accepted.
(Signed) HY. G. STEAVENSON,
Town Clerk.
Town Clerk's Office,
Darlington, Jan. 29, 1902.

CLACTON URBAN DISTRICT COUNCIL.
FILTERS AND RESERVOIR.
CONTRACT No. 3.
THE above Council are prepared to receive TENDERS for the construction of Two FILTERS and a COVERED SERVICE RESERVOIR.
Copies of the Specification, Form of Tender, and Drawings may be obtained from the Engineer, Mr. Sydney Francis, Town Hall, Clacton-on-Sea, on payment of Three Guineas, which will be returned on receipt of a *bonâ-fide* Tender.
Sealed Tenders, endorsed "Tender for Filtration and Storage Works," to be delivered to the undersigned not later than Twelve o'clock noon on Wednesday, Feb. 19, 1902.
The Council do not bind themselves to accept the lowest or any Tender.
GEO. T. LEWIS,
Clerk to the Council.
Town Hall Buildings, Clacton-on-Sea.
Jan. 31, 1902.

NEW MILLS URBAN DISTRICT COUNCIL.
TO GAS APPARATUS MANUFACTURERS.
THE Council are prepared to receive TENDERS for the following:—
HORIZONTAL WATER-COOLED CONDENSER, to pass 200,000 cubic feet per 24 hours, with Bye-Pass complete.
ROTARY SCRUBBER-WASHER, with Engine complete, without Bye-Pass Connections, to pass 200,000 cubic feet per 24 hours.
Four 10 ft. by 4 ft. 6 in. square PURIFIERS, in line, with Single Valves, Connections, Covers, and Lifting Crane complete. Green's Patent.
Double-action STEAM-PUMP, Self-Contained. 2-inch Suction.
TAR and LIQUOR SEPARATOR, 4 ft. by 4 ft. by 3 ft., with 4-inch Outlets and Graduating Screw.
LANCASHIRE BOILER, 5 ft. diameter, 14 ft. long, Single Flue, with all Mountings and Fittings complete, fitted with Meldrum's or other Force-Draught Furnace.
8-inch S. & S. PIPES per ton delivered.
8-inch SPECIALS and TEMPLATE PIPES per ton delivered.
The whole to be delivered and fixed at the Gas-Works.
Any other Information may be obtained from the Engineer and Manager, G. B. Smedley, C.E.
The Council do not bind themselves to accept the lowest or any Tender.
Tenders, properly endorsed, to be delivered to me, the undersigned, not later than Twelve noon on the 11th of February, 1902.
J. POLLITT,
Clerk to the Council.
Town Hall, New Mills,
viâ Stockport.

LANCASTER CORPORATION.
THE Gas Committee hereby invite TENDERS for the supply of a 70,000 cubic feet per hour STATION METER; also a 24-in. GOVERNOR to be fixed complete at their Gas-Works, St. George's Quay, Lancaster.
Sealed Tenders, to be delivered to T. C. Hughes, Esq., Town Clerk, Lancaster, on or before the 15th day of February next.
Any further Information may be obtained upon application to the undersigned.
C. ARMITAGE,
Engineer.
Gas-Works, Lancaster,
Jan. 31, 1902.

RHYL URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)
THE Gas Committee invite Tenders for the erection of a New RETORT-BENCH, together with Two Regenerative Settings, complete with all Ironwork and New Foul Main.
Plans and Specification can be obtained from the Gas Engineer, Mr. Leonard G. Hall, Assoc.M.Inst.C.E., on payment of £3 3s., which will be returned on receipt of a *bonâ fide* Tender.
Sealed Tenders, endorsed "Tender for Retort-Bench," addressed to the Chairman of the Gas Committee to be delivered to me on or before Monday, Feb. 17.
ARTHUR ROWLANDS,
Clerk to the Council.
Council Offices, Rhyl,
Jan. 31, 1902.

TYLDESLEY-WITH-SHAKERLEY URBAN DISTRICT COUNCIL.
GAS-WORKS.
THE above Council invite Tenders for the following:—
1. Two 24-feet PURIFIERS, with Valves and all Lifting Apparatus.
2. For TAKING DOWN the PURIFYING, BOILER, and ENGINE HOUSE.

Further Particulars as to same may be obtained on application to Mr. Gendall, Engineer, Gas-Works, Tyldesley.
Tenders (on authorized Forms only, which can be obtained from the Engineer), sealed and endorsed "Tender for ————," to be addressed to me and delivered at my Office not later than the 17th of February, 1902.
The Council do not bind themselves to accept the lowest or any Tender.
By order of the Council,
WM. J. MATTHEWS,
Clerk.
Council Offices, Tyldesley,
Near Manchester, Jan. 31, 1902.

THE Gas Committee of the Corporation of Heywood are prepared to receive TENDERS for the supply of FIRE-CLAY GOODS.
Specification and Quantities, and Form of Tender may be obtained upon application to Mr. W. Whatmough, Gas Manager.
Contractors tendering for this work must pay their workpeople at least the Standard or Trade Union rate of Wages, and observe the Trade Conditions which attach to the various kinds of work for which the Tender is sent in.
Tenders, endorsed "Fire-Clay Goods," to be sent to me not later than Tuesday, Feb. 18, 1902.
By order,
GEO. G. BOUCHIER,
Town Clerk.
Municipal Buildings, Heywood,
Jan. 15, 1902.

CRYSTAL PALACE DISTRICT GAS COMPANY.
NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Albion Tavern, Aldersgate Street, London, E.C., on Friday, the 14th day of February, 1902, at Three o'clock in the afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended the 31st of December last, to declare a Dividend for the same period, to elect two Directors and one Auditor, in the place of those retiring by rotation, and for General Purposes.
The TRANSFER BOOKS WILL BE CLOSED from the 31st day of January, until after the Meeting.
By order of the Board,
CHARLES M. OHREN,
Secretary.
Offices and Works:
Lower Sydenham, S.E.,
Jan. 27, 1902.

BARNSTAPLE GAS COMPANY.
NOTICE is Hereby Given that the ORDINARY GENERAL MEETING of the Shareholders of the above Company will be held at the Bridge Hall, Barnstaple, on Saturday, the 15th day of February, 1902, at Twelve o'clock at noon, to receive the Report of the Directors and the Accounts for the Year ended the 31st day of December last, to declare Dividends, to elect Directors and an Auditor, and to transact the General Business of the Company.
And Notice is Hereby Further Given that, immediately after the transaction of the business of the above Meeting, an Extraordinary Meeting of the Shareholders will be held for the purpose of authorizing the Directors to borrow on Mortgage or Debenture Stock, at such rate of Interest, at such times, and subject to such Conditions as they may think fit, the sum of £3000 under the powers of the Barnstaple Gas Order, 1895.
The TRANSFER BOOKS WILL BE CLOSED from the 1st to the 15th of February (both days inclusive).
By order of the Board,
F. L. SCHOFIELD,
Secretary.
Offices: 79, Boutport Street, Barnstaple,
Jan. 14, 1902.